THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS

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CLEVELAND, O., JUNE 26, 1890.

THE WEEK IN IRON CIRCLES.

General Features. At the turn of the year, it may be profitable to glance at the money market. In New York, money on call is being loaned at 4½ per cent. per annum, the supply of first-class commercial paper being quite liberal, for which, however, there is a good demand. Time money on good collateral is quoted at 5 per cent. for two or three, 5½ for four, and 6 for five, six and seven months. At Chicago the money market is active at 6 per cent. for money loans. At Boston and Philadelphia money is considerably easier than for some time back. The probable defeat of the silver bill will, on the whole, have a beneficial effect upon trade, though disappointing to the speculators. The iron markets at leading Western and Southern points show some features of interest, as will be seen from the following reports: As the time approaches for the mills to close down for necessary repairs and taking of stock the demand for pig iron diminishes, though the market retains a healthy condition, and the outlook for the future is promising. Bessemer is moving freely at Pittsburgh, mill grades are firm, and foundry irons are much fancied. At Detroit, the past week has shown no falling off in the buying last reported by our correspondents, Wm. F. Jarvis & Co. Several Lake Superior charcoal furnaces are sold ahead almost to the close of navigation, and some have advanced prices as much as $2 per ton, thereby practically withdrawing from the market. June will probably show the largest dealing in Lake Superior charcoal of any month in the history of the trade. Coke irons have not been so much in demand, but several furnaces in the Mahoning Valley have withdrawn from the market, as they have no iron they can deliver for several months. Sales of small lots have been made at $2 per ton advance over lowest prices of the year. Southern irons are firmer at Detroit, and a number of brands are asking 50 cents per ton more, and are unwilling to accept any large orders even at the higher prices. The market at Cincinnati closed the week in good form all along the line with no indication of weakness anywhere. The recent advance of 50 cents per ton in Southern coke irons has been well maintained and sales on this basis, at first lethargic, are now made readily. One large furnace company has instructed its agents to advance another 50 cents. Whether this additional step upward will be secure and hold, the coming week will demonstrate. Southen coke furnaces are so liberally sold up they feel a natural independence and disposition to wait for business. Trade in charcoal irons North and South the past fortnight have probably been the largest tonnage ever known in the same period, though prices rule conservatively lower. The advance in nails is being sustained. The general uplift in Bessemer pig, steel, slabs, blooms and structural materials imparts full confidence to a strong pig iron market. The Louisville market continues very firm, and there is no shading of prices reported from any quarter. While the heavy buying noted during the past few weeks does not exist to the same extent there is a strong inquiry, and a market in which the prospects are very good continues to be shown. Reports from Southern furnaces show small stocks on hand, and parties desiring to get iron for prompt shipment are finding some difficulty in doing so. Consumption for all purposes continues to be reported very large. Business of the week at Chicago aggregated a very large tonnage. There has been activity in every description of iron. Southern coke irons and Southern charcoal irons, because of their general excellence in mixture with our own Lake Superior ore products, continue to maintain their desirability and have a good share of the business during the week. The market closes strong with indications of an advance in prices which will certainly be realized if the consumption continues on the present large scale. The market at St. Louis has been quiet but strong, and at the close of the week there was less disposition to cut schedule prices. It is becoming evident that the consumptive demand is at least equal to the present rate of production, and no mid-Summer low prices are to be expected. Charcoal iron has been in great demand during the week at Buffalo, with heavy sales, but there still remain several large consumers who have not yet covered. In coke iron Southern furnaces as a rule are holding firmly to the recent 50 cent advance, which, coupled with the scarcity of Southern iron, has given a new impetus to business among Northern Furnaces.

Iron Ore. The situation may be summarized as one of expectancy. Some little ore, to be sure, is changing hands all the time, but the volume of business is so small as to merit no particular mention. There is little doubt that some of the larger furnace concerns need ore, and want it badly, and there is just as little doubt that the producers' agents are offering no inducements to would-be purchasers. The only question at stake is one of price. If the furnacemen who did not earlier in the season supply themselves with ore can see their way clear to cover their product for some time ahead and at a profit, little time will be lost in taking all the ore offered. This hypothesis, however, is a hypothesis only, and as the immediate outlook is not one that favors a substantial advance, the indications point to the blowing out of stacks rather than to the sale of ores. Still, judging by the total amount of ore sold thus far, say six million tons, the proportion of furnaces depending for their ore upon the Lake Superior output, and that may be included in the list of those who are not supplied, is but one-quarter of the entire furnace capacity thus supplied, and if there should be a temporary cessation of iron making in some quarters, that very action would have a wholesome tendency toward helping along both ore and iron prices. Lake shipments are far in excess of dock facilities hereabouts, owing to the inability of the railways to ship ore promptly.

Pig Iron. There is quite an active trade and the market is fairly steady, but no improvement is noted in prices and consumers seem to be able to get along very well, buying in small lots, at the market price, and from day to day, rather than place full orders for future delivery, for which furnace-men are disposed to ask more money. All things considered, Bessemer still has the call, some 7,000 tons having changed hands in the valley during the week, and at prices approximating $18.75 cash, at the furnace. Quite a good deal of forge iron is being sold at the going rate, but in quantities rarely exceeding 100 and 200-ton lots. Foundry irons are not in demand at this time, the heavier consumers holding back until they can see their way as to the future of the market One remarkable fact is the wide range of prices shown by the sales, differing sometimes 50 cents on the same grades and makes of iron. How long the market will sustain business at the ruling quotations will depend altogether upon the running out of '89 ores. After that, furnace-men will have the choice of either announcing a material advance, corresponding to the increased cost of manufacture, or of working along at an actual loss, trusting to luck for better prices. There is no change in coke prices, and none is expected before September 1.

Merchant Iron. While there is an active trade in some few specialties, such as billets, the general line is experiencing but slender business, with profit margins, where, indeed any are left, smaller than ever. Bar iron is in good demand, but despite the fact that many mills are closed for repairs and that the stock, in consequence, is running down, prices are depressed.

A WAIL FROM WALES.

What with the wild assertions of a small minority of the canning interests, the frantic appeals of the importers, and the absurd deductions of the *American Artisan*, the side of the opponents of an American tin-plate industry has not wanted for "arguments"; but it has remained for the London *Iron and Steel Trades Journal* to advance the latest and most telling point yet made. It appears that the people of Llanelly, in Wales, recently met for the purpose of considering the advisability of constructing a new reservoir and laying a 24-inch pipe main at an estimated cost of $250,000. The question was, apparently, a purely local one, but the discussion which followed the introduction of the resolution developed several points of international interest.

Llanelly, be it known, contains within its borders extensive tinplate works. These works require a great deal of water. Last Summer the water supply failed to such an extent that the works had to be closed down. The immediate necessity for the increase in reservoir capacity was based on the requirements of the tin-plate works. But just there was the rub. Mr. Joseph Maybery, Chairman of the Local Board, and managing partner of the Old Castle Tinplate Company, raised the question whether, if the McKinley tariff bill became a law, there would be any tinplate works in Llanelly to use the additional water supply. In this lugrubrious prediction he was more than seconded by Mr. Ernest Trubshaw, managing director of the Western Tinplate Works, and the climax was reached when Mr. J. H. Rogers, managing partner of the E. Morewood & Co.'s South Wales Tinplate Works, moved as an amendment that it was not desirable to construct a new reservoir at present. Mr. Rogers said the time would come when America would manufacture her own tin-plates, and whether the Welsh manufacturers could find new markets or again recover their American trade was a question which no one could tell. A few years ago the steel, pig iron and sheet iron trade was in the same position as the tin-plate industry was now, and it was said that America would never manufacture her own rails and iron. It was said that the climate was unsuitable, the wages too high, and so on; but to-day English manufacturers saw that practically the whole of their steel trade, the whole of their sheet iron trade, and the whole of their pig iron trade had gone from Great Britain to America. So the tax-payers unanimously resolved "to postpone the meeting for two months, until the fate of the new tariff bill has been decided."

Commenting on the action, the *Iron and Steel Trades Journal* plaintively remarks: "So the good people of Llanelly have decided to wait till the clouds roll by, and hope that the goodness and mercy of the wise people of Washington (D. C.) will allow them later on to enlarge their water works and in other ways to lead peaceable lives, as their fathers did before the tinplate trade existed, or America had been discovered. Some of our transalantic readers who desire to keep British manufacturers out of the American market, will sympathize with the people of Llanelly, whose supply of water is endangered by impending alterations in the tariff laws of the United States."

This is too sad. That the people of the United States should stand in the way of so great an international improvement as the enlargement of the Llanelly water works is a fresh illustration of man's inhumanity to man. We insist that some Free Trade members of the Senate bring this at once to the attention of that body. It cannot be that Congress will inact a measure that will endanger the water supply of Llanelly. Of course, it should not count, that a great American industry, giving employment to American capital and labor, would be built up by the enactment of the McKinley tariff bill—the interests of Llanelly demand an increase in its water supply, and that should settle it. Will Congress relentlessly go ahead and thus keep Llanelly out of so great a boon? Never!

STANDARD TIME IN SHOPS AND STORES.

This interesting paragraph we find in the *Railroad Gazette*:

The city of Cleveland has just officially adopted Central standard time, and the railroad companies have now for the first time put it in use in their shops, where the work has heretofore been conducted according to local time The roads have agreed to make no changes in the working hours, so far as solar time is concerned, the change being wholly in the names given to the hours for beginning and stopping. Where work has begun at 7 A. M. it will hereafter begin at 6:27.

How absurd. What workman or manager can ever accustom himself to going to work at "6:27?" It is ridiculous on the face of it. For every traveler who has been in the habit of mentally figuring backward to bring himself to railroad time, there are thousands who seldom travel and to whom the reverse mental operation will prove an inconvenience and a nuisance. Of course, nobody thinks of eating his breakfast at 5:57 and of being at his desk or bench at 6:27. By sheer mental necessity he counts forward to 6:30 and 7. The customs of generations are against the whole scheme, and we are glad to announce that the effort to force standard time upon the manufacturers, business men and working classes of Cleveland has already failed, although but a week or so in operation. Few paid any attention to the official proclamation in the first instance, and most of those who did have returned to "sun time."

THE BID OF THE BELGIAN FIRM.

When the Philadelphia *Record* speaks of "the structural iron ring" in connection with the recent underbidding of a Belgian firm on the contract for the new court house at Minneapolis, it will be in order to bring forward some proof of the assertion. The fact is, however, that there is no structural iron ring. There has been a a very large increase in the use of iron and steel for structural purposes, and, in consequence, a natural enhancement of prices, as must always follow the operation of the law of demand and supply, but that there is any "ring" is absurd.

The simple status of affairs seems to be this: About four years ago certain Belgian manufacturers carried off a large contract in the United States. Texas was building its State House at Austin, and the quantity of structural iron necessary ran into the hundreds of thousands of dollars in cost. The Belgian manufacturers shipped iron to Galveston and thence to Austin for about 3¼ cents per pound, after paying duty and freight. This was about $5 per ton below what Pittsburgh manufacturers could do, after paying freight to Austin. Since that time the cost of manufacture has cheapened somewhat, owing to increased facilities, and at the same time the prices abroad have advanced. The Minneapolis contract being a big plum, viz.: something like $300,000, the Belgians entered into competition for it, and put in a bid 25 per cent. cheaper than could be made by the Pittsburgh manufacturers. That they could do this and still pay the freight from New York seems incredible, but the Belgian consul at Pittsburgh has confirmed the truthfulness of the report.

The McKinley bill proposes a reduction of the duty on structural steel from $25 to $18 per ton. Just how the Senate will leave it is problematical; but in view of all the facts, as they appear on the surface, a restoration of the former duty would be but a matter of simple justice. If present prices are high, the natural increase in structural iron establishments can be depended upon to bring them to a normal level without inviting competition from countries where wages are 39 per cent. lower than in this country. As the *National Labor Tribune* well says: "England's tariff for revenue policy does not admit readily of protecting its hard working people, but America is supposed to have a policy that not only permits, but demands protection to home industries. This is an excellent opportunity to put it in practice, and not to do this promptly and heartily must be regarded as a retreat from the protection policy and the unauthorized adoption of the policy of 'tariff for revenue only.'"

THERE is sound sense in this paragraph, from the *Canadian Manufacturer:* "The Montreal *Herald* quotes a long list of iron products on which the Canadian duty averages about 35 per cent., and argues that this duty enhances the cost of the Canadian-made articles. Now, the American duty on such products is much higher than the Canadian duty, while England imposes no such duty, having Free Trade. Yet American pig iron, made under a protective tariff of $6.72 a ton, can be imported into Canada and manufactured into these products, and the products themselves, manufactured under a duty much higher than ours, can be imported into Canada and sold for less money than either pig iron or iron products imported from England. Is it a fact then, as the *Herald* claims, that the duty is added to the cost? We think not. Certainly not in the case of pig iron and manufactures of iron and steel." That is an argument that kills two birds with one stone: the parrot that is forever shrieking, "The tariff is a tax," and the vulture that delights in the spectacle of decaying industries, if only his pet theory may be carried out.

MR. A. F. YARROW, the head of the great English ship-building firm that has built in twenty years 1,000 vessels for the English Government, besides filling orders for the Russians, French, Turks, Portuguese, Chinese, Japanese, Brazilians, and the Argentine Republic, is now in this country, and to a reporter has been talking in a very interesting way. This remark we select as especially significant: "When there is any unpleasantness between the nations we

sometimes work for both sides. For instance, during the difference about the Zambezi River, between the English and Portuguese, we supplied each government with a number of stern-wheel gun-boats suitable for shallow river service. All the vessels were alike in every detail, the only difference being that in the English contract we had to build the vessels in sections, ship them to the Zambezi, and then put them together in twenty-four hours." It is a strange anomaly of modern international ethics that allows a firm to supply with war vessels, at the same time, both its own government and the nation in arms against it.

THE railway equipment industries of the country are in a very hey-dey of prosperity. Locomotive and car works, bridge and structural mills, machine tool manufactories, car wheel foundries, axle forges and all the rest are full of business, with every prospect, at the turn of the year, of another six months of activity.

THE first of the queer cigar-shaped steel ore carriers to be fitted up with propelling engines has just been launched at Duluth. The model of this queer craft was first illustrated in these columns and awakened considerable comment. The record of the new propeller will be awaited with interest.

WHICH way will the Senate tariff cat jump?

THE STEEL RAIL MARKET LOOKING UP.

The majority of the Eastern mills report that their order books are in good shape to September, with such reserves of capacity as are regarded safe to take care of what each mill considers its own particular trade. Instances have occurred during the week of refusal on the part of mills to take orders for immediate delivery, and some of them give even less encouragement to brokers than they have done lately. There is quite a run of small orders and particularly satisfactory demand for light and steel rails. It looks as though the sharp struggle for Summer business is virtually over, and producers are now beginning to study the ground for the coming contest over Fall and Winter work. One weighty element in the situation will be the expected competition, early in September, of the remodeled South Chicago mill of the Illinois Steel Co., practically a new plant, which will constitute a very notable addition to capacity. There has been some talk that the new rail mill of the Pennslyvania Steel Co., at Sparrows Point, will be a factor in the business of the Fall and Winter. We have good reason to believe that it will not be. Although the construction of the plant is being pushed vigorously, no date has been set for its completion, It is very doubtful, however, whether it will be running before next Spring. We understand that the capacity will be about 1,000 tons per day, but that the mill will be so designed that it can be run economically at a rate less than its full capacity. As it is, the Eastern trade is not likely to feel the advent of this new plant during the coming struggle for Fall and Winter business. During the week under review, Eastern mills report sales aggregating about 10,000 tons. The Sparks order for 20,000 tons, it is understood, has not yet been placed. It is generally acknowledged that, all things being equal, it will go to one of the Scranton mills. The report of the Board of Control shows scales up to June 1 of 1,086,000 tons, and deliveries of 598,000 tons to the same date. This does not include the Allegheny Bessemer or the Colorado mills. We quote $31@ $31.50. Concessions might be obtained under special circumstances for very desirable delivery, but not so readily as a week ago, the market being undoubtedly stiffer for deliveries up to September 1. We note a sale of 5,000 tons, early delivery, by a Pittsburgh mill, at $32.50.—[Iron Age.

Imports of Foreign Ore

The imports of foreign iron ore in the ten months ending April 30, 1889, amounted to 493,337 tons, against 993,364 tons in the corresponding period ending April 30, 1890—an increase of 500,027 tons. The Pennsylvania Steel Co, an Eastern contemporary alleges, with its recently opened mines in Cuba and its line of steamers, is largely responsible for the great increase in imports of iron ore; in the meantime imports of pig iron have diminished. The imports of iron ore are unnecessary; the country abounds with it and of all qualities, and its importation is a speculation "fad," made possible by the low prevailing duty on foreign ore. On the other hand, protected industry is able to produce crude iron from native ore at a price with which no foreign pig iron can compete; hence its importation dwindles.—[Chicago Journal of Commerce.

The Right Height for a Vise.

Work at the vise is very often of a delicate character, requiring great exactness and nicety of touch. It is manifestly impossible for the workman to do his best under such circumstances if the natural play of the arms and the body is interfered with by a cramped or strained position. A skilled mechanic knows this intuitively, and adjusts his vise experimentally until its height suits him. But there is a simple and reliable method of getting the proper height at once, which, we venture to say, few mechanics know. When standing easily at the side of the vise the tips of the fingers should just touch the chin when the elbow is resting on the jaws of the vise. At that height body and arms have free play, the touch is most certain and assured, and work far less fatiguing.

THE IRON TRADE SECTIONALLY CONSIDERED.

It is a singular fact that comparative quiet characterizes the various branches of the iron trade in this city, while accounts of more or less buoyancy are received from Pittsburgh and Western centers. Local representatives of Northern and Southern pig iron producers have doubtless sold a great deal of iron in the East thus far this year, and deliveries at the present time are represented as being considerably in excess of the June average. Contracts for iron and steel for structural purposes have been considerable in the aggregate, and it may be questioned if the orders placed for rails, track material and rolling stock have not been larger than during the corresponding period last year. As a matter of fact, there is good evidence that New York will have made an unprecedented record on business in the productions of American furnaces and mills. Nevertheless, the metropolis seems to have lost prestige relatively as an iron center. New York no longer leads in shaping in the course of values, or as a barometer for the trade of the whole country. The attention of a great portion of the consuming interests now gravitates between Pittsburgh, Chicago and Cincinnati, and swings around in the direction of Birmingham, Ala. Those sections are also looked to for cues to speculative action, and a large percentage of speculation has gone to the West during the past year or fifteen months of the periodical efforts to interest operators in "warrants" on the local exchanges.

This condition of affairs naturally excites curiosity and discussion. Doubtless the extremely conservative policy of the local representatives of the leading pig iron producers is instrumental in holding speculation in check, and the absence of that disturbing element is not without effect, in the direction of preventing spasmodic excessive purchases by consumers. The narrow dimensions to which transactions in foreign materials have been reduced through the increased and more diversified production of American mills, has also a prominent place among the influences operating against New York and to the advantage of the interior centers. The West is now the seat of the manufacture of various forms of steel that not long ago the European market supplied almost exclusively, and that trade was done chiefly through New York. The growth of diversified industries in various sections of the country has also favored the interior in a marked degree, with but little advantage to the trade in the East. As a matter of fact, New York has done little more than hold her own in Eastern territory, whilst Pittsburgh, Chicago and other Western points have profited greatly, and seem likely to derive further great advantage from the natural growth of general trade and manufacturers in the rapidly improving Southern and Western States.—[New York Commercial Bulletin.

What It Takes to Run Five Blast Furnaces.

Major Edward Doud, manager of the blast furnaces at Sheffield, recently prepared some figures for the *Enterprise*, of that city, to demonstrate what it requires to supply five blast furnaces. He says: The output of Sheffield's five furnaces will be 700 tons of pig iron per day, or 225,000 tons per year. To produce this enormous amount of pig iron will require of raw material daily 1,575 tons of ore, 1,050 tons of coke, 390 tons of limestone, at a total of 3,115 tons per day, and of 1,136,975 tons per year. Calculating ten tons to the car-load, this means that it will require 311½ car-loads of material daily to fill, as Major Doud expresses it, "the insatiable maws of these five monsters." Adding to the amount of material required to make the output, the output itself, and we have a total tonnage to be handled on account of the business of the furnaces alone of 3,815 tons daily, or yearly of 1,392,475 tons; and this amount loaded on cars, would form a single solid freight train, 976 miles long, and would require to haul 4,640 locomotives of the size and capacity of the ten-wheel Baldwin consolidators, lately received by the Sheffield & Birmingham Co., and would make the very respectable addition of 50 miles to the length of the train, giving us a total length of 1,025 miles. * * * To provide the 1,576 tons of ore, the 1,050 tons of coke, and the 390 tons of limestone required for consumption every day during the 365 days, it will be necessary, in order to provide for all contingencies, that during the working days of the week, when the weather will permit, the raw material mined per day should equal 2,600 tons of ore, 1,500 tons of coke, 240 tons of coal, and 80 tons of limestone. To mine this material and put it on the cars ready for shipment to Sheffield, will take the labor daily of 800 men for the ore, 1,600 men for the coke, 100 men for the limestone, a grand total of 2,500 men who will be employed in the section of country adjacent to Sheffield, in mining and quarrying for the Sheffield furnaces. Two thousand five hundred men will be paid by Sheffield and Sheffield instutions, a sum which, at the low estimate of $1.25 per day for each man, will aggregate the very considerable amount of $18,750 each week.

Electricity from Heat.

The daily press has grown excited recently over a report from Hartford, Conn., that a new and marvelous method of generating electricity has been discovered. It was described as a direct process, by which electric currents could be generated by heat. Those most immediately interested in the invention are, however, quite conservative in their statements, and not inclined to make sweeping claims until further experiments have been made. It will be remembered by many of our readers that a similar report arose some eight or ten years ago, having for its tangible but insufficient basis a pyro-electric battery that soon disappeared from public view. More recently, the pyro-magnetic generator created a briefer flurry. In view of past experience, we should be cautious in accepting reports of a similar kind, and should withhold judgment until the means taken to secure the alleged extraordinary result are made public, and experiments have proved or disproved the claims that, for the present, come rather from the newspapers than from the inventor. —[Electrical World.

A GERMAN VIEW OF THE MCKINLEY BILLS.

Not alone in Great Britain, but in Germany as well, the McKinley tariff bills have awakened something akin to consternation. The following from *Kuhlow's German Trade Review* (Berlin), of June 11, is interesting, to say the least:

"Of all the economical legislation that has engaged the attention of the commercial and industrial world within the last ten years, none has produced deeper and more widespread consternation than the McKinley administrative bill, now before the Senate of the United States. It would hardly be possible to imagine a more drastic measure or one more deeply affecting the intercourse of the United States with foreign nations. It erects a great protective barrier which will act as an effectual restraint on both native and foreign trade, if, indeed, it does not render trade impossible.

"Numerous reports have appeared in our columns describing the effect the bill will have on our exports, and it may be judged therefrom what enormous influence it must exert on the industrial life of Germany. For years the United States have formed one of our most important markets, and our apprehensions are, therefore, all the more justified. The same impression has been produced in business circles in England and France, and in the United States itself many warnings have been uttered against this reactionary law. In view of the momentous issues at stake, it will not be out of place to present here a complete picture portraying the origin and effect of the bill on the commercial and industrial life of the United States and, in particular, of Germany.

"Every law in a civilized country has its origin in the development of such country, even though on the surface no connection between the two be apparent. This is true of the McKinley bill, which, to most Germans, seems as if it had sprung up spontaneously. As a matter of fact, the bill is simply the culmination of a radical protectionist movement that has long been observable in the United States.

"Germany is the country which will be most seriously affected should the McKinley Bill become a law. The uneasiness prevailing in business circles here is therefore conceivable. Hardly a trade dependent to any extent upon the export but is affected directly or indirectly by the American Custom's legislation. The textile trades are the most seriously threatened. Hitherto they have enjoyed the lion's share of the German exports to America. Complaints are received from all parts of the country of business stagnation in consequence of the absence of American orders. The Rhenish and Silesian cloth manufacturers, the Saxon and Thuringian Cashmere weavers and the Saxon worked goods industry are alike plunged in despair. The last named industry is already heavily burdened in its export to America with high duties and ornerous regulations; the McKinley Bill will strike it in a vital part. Here, especially, the bill casts its shadow before it. As a Saxon correspondent writes, 'Buyers are here as usual, but the uncertainty as to the tariff paralyses all enterprise.'

"Buyers either abstain from giving orders or haggle over the price to that extent that when the order is executed no profit is left for the manufacturer. Had it not been for the revival in our trade with Norway and Sweden and the South of Europe, which has recently taken place, the position of the worked goods branch, which usually only works for the American export, would have been most critical. Manufacturers in Saxony have for a long time been working on stock and a large portion of their capital is invested in raw materials and finished articles. The same state of things more or less modified probably exists in all the other trades working for the export. * * * The United States themselves would, for many years at any rate, severely suffer in many branches of trade and industry. This is pointed out by a large number of neighened (?) American newspapers, which clearly foresee the disastrous economical consequences of the bill to the country it is intended to protect. Leaving these on one side, as their discussion would involve more space than we have at our disposal, we would simply remark that the inevitable result of the bill must be to increase the flood of articles of the cheap and nasty type, which are already said to be sufficiently numerous in the great North American republic."

Largest Saw Mill in the World.

Clinton, Ia., lays claim to the largest saw mill in the world. A correspondent to the Chattanooga *Tradesman* writes: The mill was built under the direct supervision of its present owner and operator, W. J. Young, the head of the firm of W. J. Young & Co., of this city. The building in main part is about 100 feet wide by 350 long, under one vast tin roof, sheeted and covered with iron, and, as a building, is one of the most substantial structures that could be devised for the purpose; the machinery consists of band saws of the latest improved type, three large gangs, six edgers and five trimmers, besides the various slab and cut-off saws, all located upon the second or main floor. The logs are carried up into the mill from the river, on several log ways, by machinery, and, after passing through this vast labyrinth of machinery, are sorted and distributed from the other end and run out on the various runs to its place in the yards. In the planing department, on the first floor, are eight large planing machines, re-saws, etc. In the shingle department is one large rotary shingle machine, two hand machines and two other machines, which cut about 100,000 shingles in ten hours. To furnish power to run this vast amount of machinery is required two large Hamilton Corliss engines, one of 550 horse-power and one of 275 horse power, and one vertical engine of 600 horse power, besides one Atlas engine of 30 horse-power to run sawdust, chains and carriers; to furnish steam there are 20 boilers, one battery of 10 boilers, 42x28 feet, and one battery of 10 boilers, 42x30 feet. These boilers are all fired automatically by a mechanical device, with the sawdust and waste of the mill. The mill and yards are furnished with a complete independent water works system, and a pressure is constantly kept on the various mains and hydrants for fire protection, by suitable steam pumps. While there are three large Worthington duplex pumps, 18½x14x10, standingready for immediate use, besides various smaller for boiler feeding, etc. There is also a complete electric light system, and in this department is located one dynamo of 500 incandescent lights and one of 30 arc lights, and one small dynamo run by a 50-horse-power automatic engine. On May 28th this great mill cut 1,700 logs and has an easy capacity of 350,000 feet in ten hours.

Census Results.

The Philadelphia *Press*, whose special Washington correspondent has long been Mr. Robert P. Porter, Superintendent of the Census, prints, editorially, the following: "Judging from the result of the census in 1870 and 1880, it may safely be predicted that the enumeration now under way will be full of surprises and disappointment. Eastern cities will be found to have grown more than was expected, but Eastern States less. The Middle States and Ohio will begin to show the shrinkage which the New England States exhibited in 1880, as New Jersey, Pennsylvania, Maryland and Ohio have had a heavy Western emigration in the last ten years. Western cities will be disappointed, with here and there an exception. This is the result of almost every census. Western States, particularly those west of the Mississippi, will surpass expectation. The South is an enigma. It is expecting a great increase. It is doubtful if the seaboard shows such an one. The region between the Appalachians and the Mississippi and Texas is certain to do so. This is also true of Texas. The four leading cities of the country will be New York, Philadelphia, Chicago and Brooklyn. In 1880 Brooklyn was bigger than Chicago. It will be a bitter disappointment to Chicago if it is now. Boston was the fifth city in 1880, and St. Louis the sixth. St. Louis expects to lead now, but the chances favor Boston. The grand aggregate will reach 67,000,000, if the birth-rate has been as high since 1880 as from 1870 to 1880. If the population has only made the average of advance for thirty years past the total will be 65,000,000."

New Devices Patented.

The following patents were issued to Pennsylvania, Ohio and West Virginia inventors for the week ending June 17, 1890 as furnished by O. D. Lewis, patent lawyer, No. 131 Fifth avenue, Pittsburg: John W. Abrahams, Allegheny, joint for sheet metal tubing; William Altekruse, Glandorf, O., block puzzle; J. S. Baker, Glen Rock, Pa, endless saw conveyer; S. T. Bauman, Jeffries, Pa., plow; J. C. Brown, Denver, O, ironing support; A. W. Carl, New London, O., detatchable furniture joint; W. D. Cross, Lima, rope socket; J. M. Darise, New Castle, mold for casting sad-irons; C. A. Gloekler, Pittsburg, meat rack; F. E Goldsmith, Hamilton, O., vessels for receiving liquids; F. I. Hoefle, Wilmington, O., auger; J. H. Irwin, Morton, Pa, telephone; B. F. Kendal, Jefferson, Pa., force pump; J. I. Kinsey, Easton, Pa., steam boiler; Gustave Lindenthal, Pittsburg, suspension bridge; W. H. Melaney, boot or shoe sole; W. H. Melaney, Pittsburg, boot or shoe heel; C. E. Peck, Kent, O., permutation padlock; W. J. Ritchie, Pittsburg, preparation of gas for gas engines; W. A. Sharp, Meadow Bluff, W. Va., dumping car; J. H. Shull, Findlay, O., frame house; W. L. Voelker, Morton, Pa., manufacture of incandescent lamps; John A. Williams, Moundsville, W. Va, vending apparatus, three patents; H. J. Heinz, Pittsburg. design for bottle.

The Coming Interests in Favor of American Tinplate.

The American Tinned Plate Association recently sent out circulars to leading tinners and canners of the country requesting an opinion on the proposed increase in the duty on tinplates. At the time of going to press, 2,838 have been received from Maine to California. Of this 1,863 were in favor and 975 opposed to any change in the present duty. New York leads with a vote of 253 to 87; Ohio comes next with 264 to 114. The vote in Pennsylvania, Illinois, Texas, Iowa, Kentucky, Rhode Island, Washington, Florida, Missouri, New Jersey and several other States is 2 to 1 in favor, while California is 4 to 1; Connecticut 3 to 1; Maine 3 to 1; Michigan 3 to 1; Georgia and South Carolina are a tie. A very small vote was received from the States not mentioned in the above list. The statement that 1,600 tinners in Rhode Island signed a petition remonstrating against any change in the present duty cannot be correct, as there are less than 200 tinners in the State.—[Tinplate Record.

A New Explosive.

An addition is about to be made in this country to the list of high explosives suitable for use in practical blasting, the new compound being known as "Fortis." It was invented some three years since, and as soon as it was developed into practical form a factory was erected in Belgium, where it has since been manufactured on a commercial scale, and meets with a steady demand from mine and quarry owners. Fortis is made of various strengths suitable for the different requirements of mining, and is a black powder, containing some six or seven ingredients, the chief of which are nitrate of potash, sulphur and tan. Some practical trials were carried out with fortis at the Bolehill limestone quarries near Sheffield, last year, by Mr. Perry F. Nursey, C. E., the results being in all cases most successful. The modified action of the various qualities of the powder were demonstrated, and, as regards work done, fortis was shown to have developed about three times the power of blasting gunpowder.—[London Times.

Profits of the Suez Canal.

M. de Lesseps presided at the Suez Canal meeting, at Paris, on the 4th inst. The annual report announced that the profits for 1889 amounted to 37,212,925 francs. The net dividend was 85 francs per share. The receipts from the night traffic amounted to 71 per cent of the total, against 46 per cent. in 1888. The average duration of transit has been diminished by four hours. The report asked a vote of confidence in the Council on the tariff question. Charles de Lesseps announced that the dividend for 1890 would be 91 francs, without rebate. The report was adopted by a vote of 1,244 to 200.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

MENOMINEE RANGE.

It is expected that shipments will be commenced from the Claire Mining Co's Manganate mine within two weeks, from the underground workings at the west end. On the east end of the property the vein is being stripped. From thirty to forty teams are now at work. The open pit will be in size about 220x160 feet at the top, the depth to ledge averaging twenty-five feet.—[Diamond Drill.

MESSABIE RANGE.

Capt. Mallman says he has a mine but no railway. He has done a good deal of developing during the past six or eight months and has some splendid assays. Some of these go as high as 67 per cent and are inside the Bessemer limit of phosphorus, while the average of twenty or twenty-five assay of ore taken at all depths from the surface down, shows about 60 per cent and phosphorus low. He hopes to be able to get a road in, especially as he is only about four miles off the line of the Iron Range at Messabie crossing.—[Duluth Herald.

VERMILION RANGE.

The latest reports of developments and explorations by people interested in the Duluth & Winnipeg, close to Grand Rapids, and further west than anything yet found in the iron district, will be of great interest. Not only has the Diamond property been opened, but the vein has been traced further west and two explorations are now being caarried on, one only two and one-half miles east of the Mississippi River at Grand Rapids, and the other four miles east. The Diamond property is about thirteen miles in an easterly direction. The new openings are showing well so far as work has progressed and bids fair to be mines after development is done. A strong showing of iron has also been made on the bank of the river at Grand Rapids and close to John Berkfeld's store.—[Duluth Herald.

A party from Ely reports that the Miller, or No. 26 mine, in 63-12, shows solid ore so far in the cross-cut in the shaft of nine feet, at a depth of twenty-three feet, and that it will, from present indications, be much wider. The developments on this property are watched with great interest by the leading iron men for three reasons. First, it is a short mile northeast in advance of the Chandler mine. Second, it is entirely north of the Eaton and Merritt vein of ore. Third, it is, with little if any doubt, an extension of the trend of vein of the Chandler, Pioneer and Zenith mines, yet its ore differs from them in being hard, while theirs, the Chandler more particularly, is soft ore. The Miller ore is said to be the best ore—the Bessemer and metallic iron points considered—ever found on the range, and will, if it develops into a paying mine, which it is not at present, be a great thing for this already wonderful iron country.—[Duluth Herald.

Permanency of the Soft Ore Ranges:—

With the opening of the Gogebic range, speculation was again revived as to the lasting qualities of soft ore deposits, and many experienced mining men ventured the opinion that a few years, probably a half score at most, would see the thriving towns that sprung up along the range deserted, and her mines practically worked out and abandoned. Indeed, it is not altogether certain that some of the earlier properties were not opened up with this belief. Five years have now gone by, and instead of deteriorating in number or value, the Gogebic range mines have increased many fold in both, and it is reasonably certain that the large amount of exploratory work now being carried on will develop many paying mines equally as valuable as those now being operated. At the time of the opening up of the Gogebic the depression then existing on portions of the Menominee range was cited as proof positive that the range could not be a lasting one. With the general revival of the iron industry those portions of the Menominee range, which had been idle, were again looked up, and there is at present scarcely a desirable quarter section on either the Gogebic or Menominee ranges that is not under option. Not a few have predicted that the ore would be cut out by the dyke that exists on the Gogebic, but our special correspondence of last week, from that range, hints that it is probable that ore has been struck at the Ashland mine underneath this dyke. If this be true, and we have no reason to doubt it, it goes far toward proving the permanency of the range in question. As time advances we will doubtless hear more concerning this dyke, and what lies underneath it, as a number of the mines will sink through it before long. At any rate, our soft ore ranges will continue for some time to swell our total output of ore by several million tons annually.—[Duluth Review.

Bessemer Iron Ore in Texas:—

An *Evening Wisconsin* reporter ran across Capt. Jas. A. Wood at Milwaukee mine, the other day, and the following interesting conversation took place: "The only good Bessemer ore yet found in the South," said James A. Wood, formerly a Lake Superior mining man, who is now operating in Texas, "is that which has been discovered in the Lone Star State. It is a magnetic ore, and almost chemically pure, showing sixty-five per cent. of iron in the furnace. It looks so much like the Champion and Republic ores that one can hardly tell them apart.

"The Texas iron properties which I am interested in," continued Mr. Wood, "are located near George M. Wakefield's manganese find. Mr. Wakefield has had twenty-nine diamond drill holes bored in order to test the extent of his property. Unlike most manganese deposits, his is a regular vein, instead of a bed or layer. It extends at least half a mile, and is about fifteen feet wide. It is the only valuable manganese property in that section of the country, and Mr. Wakefield, I think, will make an enormous fortune out of it. The cost of mining is not any greater than mining iron ore—certainly less than $5 per ton, and it will cost about $10 per ton to ship it to St. Louis, where it will sell for $45 per ton."—[Milwaukee Star.

Mr. Wood is employed as a mining expert by the owners of the North Texas National Bank, of Dallas, and is interested with them in some mineral land. He expects that Henry Eqall, F. R. Maloney, R. D. Landler and Julius Schub, of Dallas, who are associated with him, will arrive in Milwaukee this evening on a business and sight-seeing trip.—[Milwaukee Star.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, June 18th, are as shown by the appended statement, condensed from the Marquette *Mining Journal*:

MARQUETTE RANGE.

American	202	Humboldt	4,514	Pitts. & L. Angeline	77,946
Barnum	2,818	Imperial	5,259	Prince of Wales	4,333
Buffalo	21,149	Jackson	32,279	Prout	3,039
Cambria	25,28[illegible]	Lake Superior	86,973	Queen	24,703
Champion	62,227	Lillie	11,768	Republic	59,142
Cleveland	68,220	Lucy	15,674	Salisbury	25,954
Cliffs Shaft	47,748	Marquette Ore Co	1,057	South Buffalo	23,333
Detroit	586	Michigamme	18,229	Volunteer	36,157
Dexter	630	Milwaukee	9,965	Winthrop	34,961
East New York	10,299	Negaunee	20,645		
Grand Rapids	1,699	New York			
Total, Marquette Range					736,790

MENOMINEE RANGE.

Aragon	4,564	Half and Half	383	Paint River	13,893
Armenia	10,603	Hamilton	7,449	Perkins	2,059
Chapin	193,748	Iron River	34,827	Pewabic	9,036
Commonwealth	30,021	Ludington	20,626	Shafer	15,799
Cyclops	19,814	Mastodon	22,863	Sheridan	467
Dunn	40,564	Millie	10,383	Vulcan	36,465
Florence	44,227	Monitor	1,540	Youngstown	9,903
Great Western	23,074	Norway	18,802		
Total, Menominee Range					577,110

GOGEBIC RANGE.

Albany	7,753	Federal	1,638	Pewabic	
Anvil	13,487	Germania	14,381	Ruby	993
Ashland	127,434	Iron Belt	23,521	Section 33	24,532
Aurora	75,560	Montreal	6,030	Superior	5,672
Brotherton	11,862	Mt. Hope	10,930	Trezona	16,823
Cary	18,761	Norrie	226,483	Windsor	9,688
Colby	76,156	Pabst	30,931		
Father Hennepin	4,200	Palms	9,508		
Total, Gogebic Range					721,443

VERMILION RANGE.

Minnesota Iron Co	131,877	Chandler	76,280
Total, Vermilion Range			208,167
Grand Totals			2,243,510
To corresponding date of 1889			1,838,769

The shipment of ore by lake goes steadily on from the four Lake Superior ranges. The total up to June 18th is 2,243,510 gross tons. Of this total, the Marquette range contributes 736,790 tons. The Gogebic follows with 721,443. The Menominee is not far behind with 577,110 tons, while the Vermilion range has reached a total of 208,510. The shipments for the week foot up 295,938, as compared with 291,142 for the corresponding week of 1889. The Marquette range is ahead of her last year's record 45,834 tons. The Menominee beats hers by 94,262. The Vermilion is 3,851 tons behind the shipments of 1889. The Gogebic records an increase of 268,496.

Developing the Elba Iron Deposits.

Italy possesses only one source of any importance whatever of production of iron ore, and that is the island of Elba. A group of foreign and Italian capitalists propose, and will probably take over the whole of the Elba mines, and provided they can feel reasonably assured of the continuance of the present import duty, are ready to set up blast furnaces for the production of Italian pig, feeling confident of a ready and profitable market in the demands of the rising iron industries of Italy, which are able now to bear a heavy duty upon their raw material and yet to live. At the present moment Elba ore exported abroad pays royalty to the Italian Government of 3s. per ton, whilst upon the very small quantity sent over to Italy only 5¼ is paid, and upon the import of foreign pig 4s. 3d. a ton is levied. Last year over 100,000 tons of Elba ore was exported, and more than 325,000 tons of pig scrap and old iron was imported into Italy. This formed a considerable source of revenue and it is a nice question whether the Government can afford to resign it.—[London Iron and Steel Trades Journal.

American Farm Machinery in Scotland.

American agricultural implements are making some headway in Scotland, according to Consul Brown, of Glasgow. Within a few years, American Oliver chilled plows have come into use and on light soil are likely to be much more extensively used. The farmers believe them to be adapted to Spring work, but think them too light for use in the Fall. Among the American mowing machines, the Walter A. Wood is, according to Consul Brown, as largely used as any and has kept his hold against English and Scotch machines. The Wood reapers are about the only ones sold, but are not so highly appreciated as the reapers of the Scotch and English manufacture. Wood's binder is also in favor, although the binder made at Toronto by Massey & Co. has been making considerable headway. American-made hay rakes and binders are also in use in Scotland, and other machines of American invention and manufacture are finding recognition.—[Farm Implements.

New Method of Handling Pig Iron.

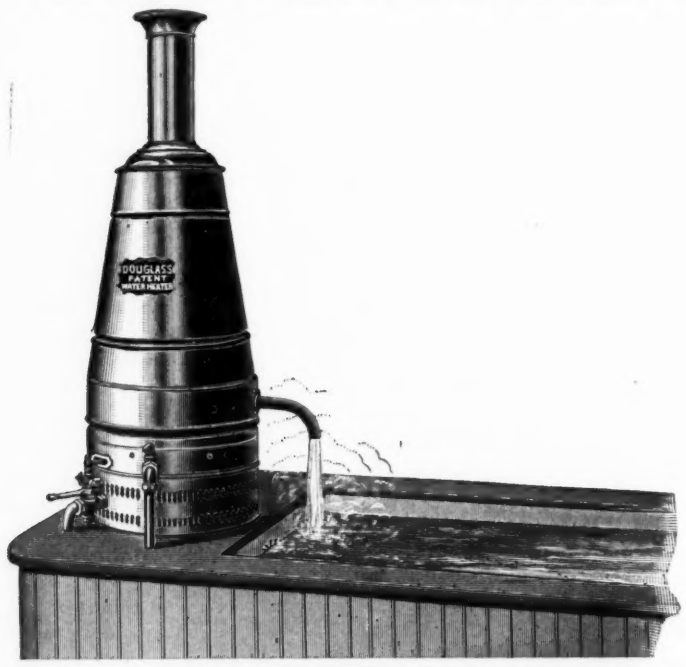
Mr. Jerome L. Boyer, of Reading, Pa., Superintendent of the Chestnut Hill Furnaces, has brought out an ingenious apparatus to dispense with hand labor in removing pig iron from the pig beds. The apparatus consists of two grappling devices, of four hooks each, suspended from trolleys running on a traveling carriage, which spans the cast house and commands all the pig beds. The grapples are worked by steam pistons. A man and a boy are all the operating force required. The grapples take up several pigs at once, and can remove the iron as soon as it is cool enough to retain its shape.

A HOUSEHOLD CONVENIENCE.

It is safe to assert that in every household in the land there are occasions when the bath of some member of the family becomes an impossibility, by reason of a lack of hot water. This state of affairs may have resulted from the extinction of the fire in the range by which the water in the kitchen boiler became cold, or some other member of the family may have gratified his or her desire for a bath just before, and thereby exhausted the supply. This is not only annoying, but it is at times productive of serious inconvenience. There are other occasions where sickness or injuries make the use of hot water imperative, and then its absence may be harmful, if not dangerous. An appliance by which water can be heated at once, and at any hour of the day or night, is sure of appreciation, and its value can hardly be overestimated. If the apparatus cannot only heat water quickly but supply it in unlimited quantities, its value is greatly enhanced. Such a product of ingenuity and skill has been in use for a number of years in foreign countries, but was not introduced into the United States until 1886. Since that time there has been a large and steadily increasing demand, and it is rapidly winning its way into public favor. Testimonials without number have been sent to the manufacturers warmly attesting the merits of the invention.

The invention alluded to is the Douglas patent instantaneous water heater, represented in the accompaning engraving, and is manufactured by the Instantaneous Water Heating Co., of 210 Illinois street, Chicago, Ill. The heat is furnished by gas, and the heater can be used in any place where gas and water can be obtained. It is made in different sizes, adapted to baths, offices or domestic purposes. It is simple in construction, and with ordinary care will last a lifetime. Its durability and effectiveness are two of its strongest points. The heater is finished in copper or nickel plate, and its appearance is in the highest degree ornamental, whether set up at the foot of a bath tub or on the edge of a basin.

The operation is as follows: Near the base of the heater is a movable arm, to which the gas is affixed; this arm when swung passes through a slot in the



THE DOUGLAS INSTANTANEOUS WATER HEATER.

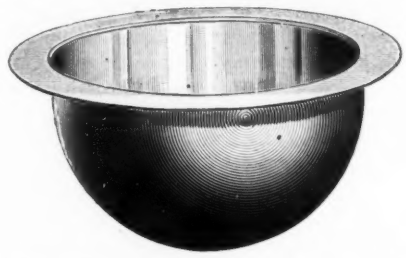
side of the heater, where the flame from the burner ignites the gas from a number of jets arranged in circular form and giving forth a strong heat. The water passes through a copper pipe having a coil near the top, and then sprays over a copper cylinder, which is heated by an atmospheric burner. The water, after spraying, descends on the outside of the cone, thoroughly heated, and passes off through the delivery pipe, as pure as when it enters the heater. The temperature can be regulated by the quantity of water passing through. The operation is so simple that any person of ordinary intelligence can manage it. The gas is only required until sufficient hot water is obtained, and its cost is trifling. It will heat enough water for a bath tub of ordinary size in from 8 to 15 minutes, and small quantities almost as soon as the gas is lighted. The accompanying cut is an excellent representation of the heater set up at the foot of a tub. It is adapted for the use of coal, natural gas, naptha, or oil gas, also with gasoline gas.

The company also manufacture the Acme gasoline instanteous water heater, which will heat enough water for a comfortable bath in from 10 to 15 minutes at a cost of less than a cent for gasoline. The construction of this heater is similar to that for gas, the principal difference being the addition of a tank for fuel. It will be found very serviceable in localities where there is no gas, and in the absence of water works the necessary supply can be drawn from a tank. The heater is perfectly safe from explosions, and is highly ornamental, the outer cylinder being of copper or nickel plated. It is always ready for service, and is in every respect a valuable household convenience. Economy, safety, simplicity and durability are the features that commend this device to public favor. Any further information relating to the merits of this excellent heater may be obtained by adressing the manufacturers as above indicated.

THE July *Wide Awake* gives the young people the fun and the sentiment of the month; base ball and Independence celebrations and patriotic reminiscences abound from beginning to end. The frontispiece illustrates "The Little Fifer," a true story by Helen M. Winslow, of a little lad of '76, who was missing from his home in Shirley, Mass., and turned up in Washington's camp, where his father found him at last. Mrs. Clara Doty Bates has a true story, too, a capital one, of "Grandfather's Musket," relating the escapades of two enterprising boys who built an Independence Day cannon out of a precious Revolutionary relic of Valley Forge and Lundy's Lane.

NEW STEEL CYLINDER HEAD.

We illustrate herewith a steel cylinder head, made by the Avery Stamping Co., of Cleveland, O. These heads are 14″ in diameter, 10″ deep with a 2″ flange, and are made from cold rolled wrought steel of 11 gauge. They guarantee these heads to be true to gauge and without wrinkles, and claim they



can put sheet metal into any required shape, without changing the thickness of the original sheet, which is something heretofore deemed impossible by the leading die makers throughout the country.

Magnetization of Steel Cylinders.

An interesting note concerning the effect produced upon cylinders of steel along which strong currents are passed, is given in a recent issue of our contemporary, the London *Electrician*. It is said that, in 1887, M. Paul Janet showed the cylinders of steel along which strong currents had been passed, became permanently magnetized transversely. By extending the experiments some very striking results have been recently obtained by M. Decharme, who has described them in the *Comptes Rendus and La Lumiere Electrique.*

The cylinders used were split longitudinally, and, after the passage of the current, the magnetism of the parts was tested by iron filing figures. It was then evident that not only was the iron magnetized transversely, but the intensity of the magnetization varied in a regular undulatory manner along the bar, the lines of force arranging themselves in somewhat the same way as fine powder in a vibrating tube. The effects could not be accounted for by supposing the iron hetrogeneous, because the nodes and loops occurred at about the same distance for different bars of various diameters and lengths. M. Decharme concludes that there is a great difference in the magnetization of an iron core by a steady current passed through a solenoid surrounding it, and that of an iron bar through which a current actually passes. In the latter case, M. Decharme considers that the current is propagated in waves during the very short time necessary to produce the magnetization, and compares the phenomenon with the well-known undulatory magnetism produced by the oscillatory discharge of a Leyden jar. The effect is probably due to the starting of the current, and it is therefore unfortunate that no particulars are given of the manner in which this was done—whether switched on suddenly or increased very gradually to its full value. In the latter case, no effect might have been produced, as strong currents were needed to show the phenomenon. The experiments of Blaserna have shown that undulations do actually occur for the first few moments after starting the current, and it is possible that that these may be much accentuated when part of the conducting circuit is of iron. The experiments are of interest because they suggest that many phenomena usually attributed to want of homogeneousness in iron may really be due to successively starting and stopping a magnetizing current.

The Fire Loss in May.

The fire loss in the United States and Canada for May, as complied by the New York *Commercial Bulletin*, was $8,838,100, showing that the gratifying reduction in the waste of the national resources over the two preceeding years continues. The following table shows the losses for the first five months of this year in comparison with those during the same period of 1888 and 1889:

	1888.	1889.	1890.
January	$16,040,000	$6,898,700	$3,179,300
February	11,213,500	12,800,000	7,387,025
March	9,918,100	10,912,000	8,466,300
April	11,326 350	15,987,000	8,285,520
May	9,188,500	9,915,300	8,838,100
Total	$57,686,450	$56,513,000	$42,156,245

In the month just closed there were 141 fires, involving a greater loss than $10,000. Of these, 48 fires destroyed values of from $10,000 to $20,000, 24 fires of from $20,000 to $30,000 each, 24 of from $30,000 to $50,000 each, 27 of from $50,000 to $100,000 each, 13 of from $100,000 to $200,000 each, and 5 of over $200,000. Such insurance companies as have a large and evenly distributed business must have made heavy profits during May, as in addition to the light aggregate the fact must be considered that some of the heaviest losses involved little or no insurance. During the past week a number of fires have been extinguished by the various makes of sprinklers.

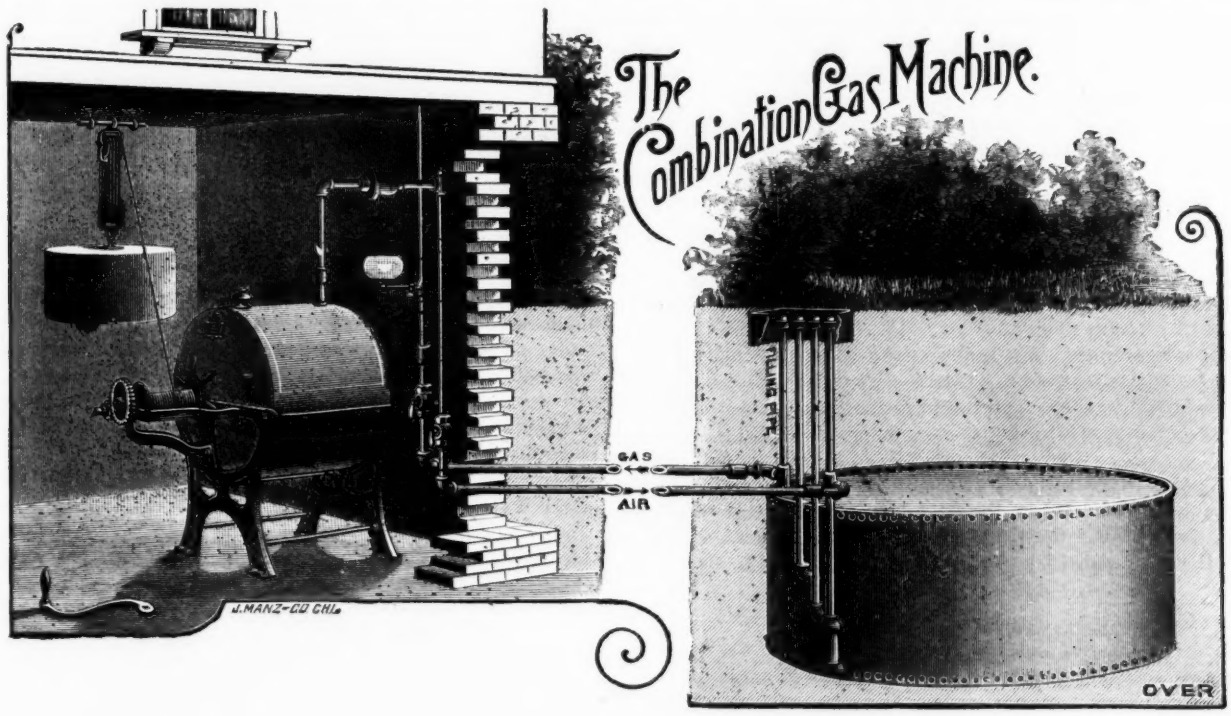
A New Use for Aluminum.

Fruit packers have experienced trouble through the effects of acids upon the galvanized wire shelves on which the fruit is dried. It has been suggested to use cloth made of pure aluminum wire, upon which fruit acids have no effect. Large steamers of aluminum are now being made for fruit evaporation, and it is stated that Crosse & Blackwell, of London, are using aluminum dishes for cooking fruit and making jellies.

THE COMBINATION GAS MACHINE.

The combination gas machine consists of a blower, or air pump, and a carbureter, or generating tank. The carbureter is an air-tight tank of heavy galvanized iron, divided horizontally into shallow cells. These cells are partially filled with gasoline, over the surface of which air may pass and become "carbureted," or impregnated with the vapors of the gasoline. In order to increase the evaporating surface, partitions of absorbent material are so placed in each cell as to form a narrow, coil-shaped passage, on every side of which is gasoline. The air passes through each of the cells in turn, and following the convolutions of the coil, is made to traverse a greater distance in going through this carbureter than many others of the same size. The carbureter is placed outside the building, and with its connecting pipes, is buried in the ground at a depth that precludes possibility of accident, and prevents the temperature of the gasoline, or the gas, being affected by the weather.

The motive power of the blower is a weight which must occasionally be wound up. The blower takes in air from the room in which it atands, or, by an induction pipe from out of doors, and forces it through the air pipe to the carbureter. Here the air passes over the surface of the gasoline in the several cells and, enriched with its illuminating properties, returns through the gas pipe to the riser in the building, and is conducted to the various burners. When the lights are shut off the pump is at rest, and no gas is made. Turning on one or more lights starts the machine in motion. It will thus be seen that the apparatus is purely automatic, making only as much gas as is wanted, and only as fast as it is used. The lights may be turned out, the machine left unused for a year, and it will then be found ready to light. For further particulars address the Detroit Heating & Lighting Co., Detroit, Mich.



SOME RECENT BIG THINGS.

There is a notable tendency in industrial enterprises in recent times not only to concentrate capital into large concerns, but to have structures and machinery of the largest possible kind, and to drive it with extreme rapidity. This is pre-eminently the day of big things, using the word in its ordinary sense to mean large, massive, heavy and bulky. Ocean steamers are growing larger and more powerful. Locomotives, cars, railway tracks, bridges, are all made heavier. Blast furnaces have increased in size, and their output has increased enormously, so that a product of 300 tons a day is no more uncommon than one of 300 tons a week was twenty years ago. A Bessemer steel works has recently made the record of 30,000 tons of steel in one month. Open-hearth furnaces are now erected with a capacity of 30 tons, or three times the capacity of those ten years ago. In rolling mills the same progress has been shown. A plate was rolled, in Pittsburgh, 30 inches wide by 85 long, ⅜ inch thick, weighing 7,480 pounds.

In steam and electric engineering the same tendency is seen. At the Homestead Steel Works, Pittsburgh, there is about to be placed one of the largest Corliss engines in the world, with a horizontal cylinder 54x72 inches. The fly-wheel will weigh 200,000 pounds. The whole weight of the engine will be over 500,000 pounds, and it is expected to develop 3,500 horse-power. A Corliss engine, the largest in the world, was built at the Soho Iron Works, Bolton, Eng. It is of 5,000 horse-power, of the vertical type and stands 48 feet high. It is designed to drive the Ferranti dynamos, 45 feet in diameter, mentioned below. The West End electric station in Boston is to have 13 engines of 1,000 horse-power each. They are to be triple compound, with cylinders 21, 36 and 52 inches in diameter. The power is transmitted by two belts for each engine, each belt five feet wide. Steam will be furnished by 24 water-tube boilers, each rated at 500 horse-power. The new cable railway station of the West Side Cable Railway, in Chicago, has two Greene engines, each 36x72 inches; each engine weighs 238,000 pounds, and has a capacity of 1,200 horse-power. A new water-tube boiler designed by T. F. Morrin, of Jersey City, which is located at the Westinghouse electric light station in Twenty-fourth street, New York City, contains 600 three-inch water-tubes of a peculiar bent shape, expanded at each end into an internal cylinder, 48 inches in diameter. The aggregate length of the tubes is 7,200 feet, or about a mile and a half, and the boiler has 6,000 feet of heating surface, and is said to be capable of developing 1,000 horse-power.

The Ferranti dynamos used in the Deptford lighting stations weigh 500 tons each.

Two dynamos of 10,000 lamp capacity are being made for Berlin, each of which will require about 1,000 horse-power.

There are no data now existing which will enable any one to predict what will be the size of boilers, engines, dynamos, steamships, bridges, cars, locomotives, office buildings and other structures, ten years hence. Everything in the engineering line seems to be changing at a more rapid rate than at any previous period. When the single engine reached its limit in ship-building, the compound engine came in. When shafts and screws seemed to have grown as large as they could be made twin screws and shafts were used, and at the same time facilities for making still larger shafts and screws were perfected. So it is in every branch of engineering; as soon as a limit is fixed some one finds a way of overleaping it, and the limit is placed further ahead.—[Engineering and Mining Journal.

New Method of Strengthening Iron Rods.

A patented plan is reported from San Francisco, whereby the strength of iron rods used in the erection of edifices is greatly increased. It has been found by experiment that rods or bars of iron may be given a greatly increased tensile strength by the simple process of twisting the bars when cold. The measure of this increase depends upon the quality of the iron and the degree of torsion. The best quality of iron given, say, six turns to the lineal foot, has its tensile strength increased 50 per cent, permitting a great reduction of weight in the iron employed. The following table is derived from careful tests made by Lieutenant Gilmore, U. S. N., and at the California University. Similar experiments in England show essentially the same result, three twists giving as high as 41 per cent. increase in strength:

INCREASE OF TENSILE STRENGTH BY TWISTING.

Material and Size.	No. of Twists Per Foot.	Per Cent. Increase.
Three fourths inch square	⅛	3
Commercial iron	¼	5
Commercial iron	1½	17
Commercial iron	2¼	18
Commercial iron	3¾	20
Three-fourths inch turned down	6	24
Three-fourths inch Norway iron	6	52
Three-fourths inch Norway iron	6	53

Assuming even less than this table warrants as the available gain, it is easy to compute the saving in weight in the construction of any large edifice.—[Ohio Valley Manufacturer.

Analyses of Cranberry Ores.

We are indebted to the East Tennessee Mining & Improvement Co. for the following analyses of ores from the Cranberry district:

	Metallic Iron.	Phosphorus.	Titanium.
Cranberry mines	58.35	0.0071	0.097
" "	40.79	0.0767	none.
" "	41.13	0.0319	0.012
" "	50.77	0.0087	0.013
Davis tract, East Tennessee Mining & Improvement Co	45.07	0.045	none.
Poplar opening	47.28	0.017	none.
East Tennessee Mining & Improvement Co	54.63	0.032	trace.
" " " " "	63.63	0.036	none.
Fork Ridge Mining & Improvement Co	55.12	trace.	none.
Wilcox Mining & Improvement Co	57.74	0.017	none.
East Tennessee Mining & Improvement Co	56.14	trace.	none.
" " " " "	65.39	0.0067	none.

The company, in which a number of prominent Philadelphia iron men are interested, have ore lands in the Cranberry district, and are pushing the claims to greatness of the town of Watauga, Tenn, where, it is claimed, Bessemer pig iron can be made at $11.—[Iron Age.

PITTSBURGH STEEL MEN ON PAN-AMERICAN TRADE.

The Pittsburgh *Dispatch* publishes numerous interviews with Pittsburgh manufacturers regarding South American trade, from which we select the following:

All the leading iron and steel manufacturers assert their firm belief in the efficacy of the system of subsidizing vessels. Their confidence in that method of encouraging spirited trade with South America is firm as a rock. With one accord they assent to the proposition to establish a line of steamships by Government aid.

Mr. A. M. Byers, head of one of the most flourishing iron manufactories in Western Pennsylvania, remarked:

"I am thoroughly convinced of the great possibilities of trade with the Pan-American nations. Every step in that direction merits popular approval. The iron business would receive considerable benefit, and, in fact, the advantages to be derived with reciprocity are unlimited. They are not confined to any particular class, but widespread in the exercise of their beneficent influence."

Some doubts are entertained by a few of the foremost manufacturers as to the advisability of subsidizing vessels. In the light of recent events, they are inclined to be chary of recommending any such plan. One who did not desire to make a bold statement in that particular, for this very reason, was Mr. John L. Lewis, Chairman of the Lewis Foundry & Machine Co. He said:

"Coming right on the heels of the tremendous manifestations of disapproval made by many people regarding the granting by the Government of Western lands to railroad corporations, I think the subsidizing of United States vessels to South America will probably not be favorably received by some. Nevertheless, the system presents numerous fine points worthy of the consideration of every business man."

"Something must be done," said Mr. Rea, of Robinson, Rea & Co., founders. "There is a wide field in Brazil and neighboring States for our goods. Foreign traders enjoy a monopoly of the thing. We ought to do something to put our products on the South American markets in quick time, and on American ships."

Mr. A. E. W. Painter observed: "I have not made a study of the matter as recently brought before the people, but am decidedly in favor of subsidizing steamers, and believe the iron industry and a great many other interests will be materially benefited by that system."

One of the prominent members of a leading iron manufacturing firm in Pittsburgh—Mr. Charles C. Scaife—said: "I have always favored subsidizing vessels in order to establish better transportation facilities between North and South America. That is the best way devised so far to open up prosperous reciprocal relations."

Mr. W. Dewees Wood, of the McKeesport Sheet Iron Co., made the following remark: "This country has an excellent opportunity to effect a healthy exchange of commodities with the South American republics, and I certainly think the Government should subsidize vessels."

Gambling in Pig Iron Warrants.

The correspondence which has appeared in our columns for the past few weeks testifies most unmistakably to the deep and widespread interest which is felt in the subject of this article by the leading members of the iron trade. The correspondence has been most representative, from makers and manufacturers, merchants and brokers, in all parts of the kingdom, and contains many valuable suggestions which cannot fail to be of use to those who are considering the best means of preventing a recurrence of the gamble. The Iron Trade Association, in appointing a committee on the subject, and availing themselves of the sources of information at their command, and the great ability and wise experience of many of its members, have taken the right course, a course which we are sure will be followed by useful and practical recommendations.

Probably there may have been as extensive speculations in iron on former occasions, but the circumstances of the recent crisis were peculiar. The trade has been for years in a most depressed and unsatisfactory state. A steady improvement took place, which seemed to spring from natural causes, and was likely to be permanent; then, when hope was strong, the wild spirit of gambling became rampant, legitimate business came to a standstill, prices were rushed up, and the inevitable reaction was soon followed by widespread loss and ruin, leaving the trade in a worse state than before the revival. No wonder that steady men of business are annoyed at the wild action of an irresponsible ring. The interest in the question extends beyond the trade. Iron and coal are the two great foundation industries of our commercial greatness; if they suffer from the action of reckless speculation, the entire community is affected.—[Iron and Coal Trades Review, London.

Selecting Foremen.

The selecting of foremen is one of the most difficult duties that confront owners of manufacturing establishments. It is often found that the man who is the most capable artisan, and well up in all matters relating to his trade, is entirely void of the force of character and power to command others, which are essential features in a good foreman, while the man who possessess the latter qualifications is often a very inferior worker. We have heard of a manager of a great establishment, who appointed an artisan to be foreman, owing to having observed that he was always moving hurriedly between the workshop and the store. The appointment elicited the fact that the new foreman, being a poor workman, had been content to "run the messages" for the other workmen, and his alertness while on the trot between the workshop and the stores had led the manager to fancy that he was exceptionally earnest, faithful and capable servant, and worthy of promotion. It is also well known that a large percentage of workmen spend their evenings doubtfully, and are never fit for their duties till a good part of the working day is spent. Cheap foreman are generally without backbone and worthless. Those who superintend should be superior to those under them in respect, know how every job should be done, and how every man in the shop is employing his time.—[Ex.

Fire Losses in the United States.

In the fifteen years during which the *Chronicle* has kept its careful record of fires, one thousand three hundred and sixty-five million dollars' worth of property has been destroyed by fire in the United States. The magnitude of this sum is almost beyond comprehension. Through the system of fire insurance the people have taxed themselves to relieve the misfortunes of the direct sufferers, and have repaid to the latter in this manner nearly seven hundred and sixty-nine million dollars. The loss of the remaining five hundred and ninety-six millions was borne by those whose property went up in smoke without succor of any kind. How many hundreds of these millions were destroyed by criminal fires, how many hundreds of millions by a carelessness that was akin to criminality, how many hundreds of millions by a careless and ignorant construction, cannot be precisely stated. Most fire underwriters would probably consider an estimate that one-fifth this great property loss in fifteen years, or about two hundred and seventy-five million dollars, was caused by incendarism and arson, as far below the fact. Yet, on the basis of the apparent percentage of incendarism in 1889, much more than two hundred and seventy-five million dollars of property values were consumed in the United States within a period of fifteen years by the torch of the incendiary. Without the agency of insurance, through which the community largely takes upon itself these heavy annual losses as they occur, the loss by fire, if continued at the present rate, would be an intolerable burden upon the people. Tens of thousands of citizens would be ruined every years and, perhaps, driven by their misfortunes to pauper's graves. There would be an end to the present commercial activity. General stagnation, if not the worse condition of individual dejection and mutual distrust, would inevitably result.—[Toronto Monetary Times.

How to Build up Canada's Iron Industry.

All the evidence extant on the subject points to the fact that Canadian ores are as rich in metal as American ores; that they are as easily mined, and that mining and other labor is cheaper in Canada than in the United States. The manufacture of pig iron in Canada is ridiculously small, although it is protected by a duty of $4 a ton, and encouraged by a bonus of $1 a ton, the production being only 30,000 tons a year. There is no duty upon mining machinery, nor upon coke fuel when consumed in manufacturing, and no country possesses greater facilities for manufacturing iron than Canada, and yet the industry is neglected. The consumption of iron in Canada is large enough to keep many furnaces in blast; yet those who own the mines fold their hands and whine for Reciprocity and grumble because Canada don't choke it out of the United States. If they wait for Reciprocity, or for iron ore to be placed on the American free list, they will die of old age without their hopes being realized. If the Canadian duty on pig iron is not high enough, let them appeal to the Government to raise it. The duty should be raised to at least $7 or $8 a ton.—[Canadian Manufacturer.

Talc for Keeping Boilers Clean.

In cases where the water for boiler use contains impurities, especially carbonate of lime, Mr. P. Vigier, in *Moniteur Industriel*, recommends to mix powdered talc with the feed-water, or periodically to put a certain quantity of it into the boiler. The talc acts mechanically; in its rapid movement in the boiling water it carries with it the particles of carbonate of lime, which otherwise are deposited and form scale. In a series of experiments Mr. Vigier has found the proper proportion of talc for this purpose to be $\frac{1}{10}$ of the weight of the carbonate of lime deposited. Water leaving a deposit of 200 g. per cubic meter would thus require 20 g. powdered talc for 1,000 l. water evaporated. The deposit, which takes the form of mud, is periodically blown off.

All There Is in It.

It is a cold, raw, damp, disagreeable day when a West Virginia timberman fails to get out all there is in the business from an economical standpoint. He cuts the logs, sells the bark to the tanneries, and makes wood pulp of the branches, while occasionally he allows the stump to petrify and has it sawed up into razor hones. Recently an immense stump nicely petrified and weighing a ton was dug out at Powhattan, and sent to the stone cutting establishment, at Berea, O, to be sawed into razor hones and carpenters' whetstones. The stump looked very much like the original wood and bark, and it is said to have a very fine whetting grain.—[Ex.

OSCAR WILDE contributes the complete novel to the July number of *Lippincott's Magazine*. It is entitled "The Picture of Dorian Gray," and it is a story that everybody will want to read. Edward Heron-Allen, the well-known expert in palmistry, has an interesting article upon "The Chiromancy of To-day." Mrs. Bloomfield-Moore contributes an important article on "Keely's Contributions to Science." Other articles which will attract attention are an interesting biographical sketch of Senator John J. Ingalls, and a paper upon "The Powers of the Air," by Prof. Felix L. Oswald.

IT is rather a startling fact that the most densely-populated square mile in the world is not in China or Belgium, but in the City of New York, and that it is inhabited by 270,000 people, the large part of whom are Italians, who speak their native language, and retain their native customs.

ONE fare for the round trip between all points on the Cleveland & Canton R. R., Jul 3d and 4th. Tickets good to return until July 5th.

VIBRATIONS IN MACHINERY.

BY C. R. TOMPKINS, M. E.

While a number of articles have been published in the various trade journals upon the subject of vibrations in buildings used for manufacturing purposes, and while many remedies have been suggested, but little has been said that satisfactorily accounts for the cause of it. The subject of the vibrations in machinery or the causes which produce them, seems in most cases to have been left out of the question. That there always is, and always will be, more or less vibrations in not only the buildings in which fast running machinery is located, but also in the machinery itself, there can be no doubt,but the cause of those unusual vibrations which sometimes affect both the machinery and the buildings in which it is located, may be generally accounted for upon scientific principles. It is a well-known fact that constant and uniform motion will produce more vibrations than that which is irregular and not constant. For instance, a small company of soldiers is marching over a bridge with a uniform step will produce a greater vibration in the bridge than twice that number would in marching over it in an irregular manner, without keeping step with each other. Even a good-sized dog in trotting over the same structure at a uniform step will produce a greater vibration of the structure than a team hauling a heavy load.

All vibrations depend upon a certain amount of impulse. No matter how small that impulse may be, if applied in a uniform manner vibrations will be felt, and those vibrations will increase just in proportion to the amount of impulse given. The pendulum of a clock is a fair, practical illustration of this principle. At every vibration of the pendulum there is a small impulse given; so long as that impulse is kept up and given in a uniform manner, no matter how small it may be, so long as it is sufficient to overcome the attraction of gravitation and atmospheric resistence, the vibrations will continue. The same principles are applicable to machinery. With almost every class of machines uniform motion is essential, and if in the operation of those machines sudden shocks are necessary, as long as those shocks are given out in a uniform manner, and within the same space of time, a certain amount of vibration will be given to the whole machine, which in a majority of cases will communicate itself to the floor or any part of the building to which it may be attached. Where there is a number of machines of the same kind running in the same building, all running at the same uniform speed, the vibrations of the same being uniform and all given out at the same moment of time, they will unite and communicate a stronger vibration to the building than otherwise.

A few years ago the attention of the writer was called to this subject by a circumstance which is here related, which will furnish a practical illustration of this theory. In the second story of a strong and substantial brick building there were located four small engines of about 10 horse-power each, standing in a line by the side of each other, and all running at a uniform speed of 125 revolutions per minute. When all were running at the same time, which was frequently the case, the oscillations in the building were so great as not only to render it very unpleasant, but also to materially interfere with some parts of the work. Believing the vibrations were from the causes just mentioned, I suggested turning two of them around so as to stand at right angles with the other two, and then changing the speed of each a few turns, so that no two would run at exactly the same speed. This suggestion was acted upon, and from that time the oscillations ceased. It was evident in this case, after the change was made, that as no two gave the impulse in the same time the vibrations which would be caused by one were broken up by the other.

Vibrations, to a certain extent, are necessary and unavoidable in all machinery. But there are two kinds of vibrations, both of which do not necessarily result from the same cause, and while one may be necessary and unavoidable, the other, which arises from causes that do not necessarily exist, should be sought for and avoided. The planing machine may be taken as one practical illustration. The action of the cutters upon the lumber necessarily produces a series of shocks and a certain amount of vibration that can not be avoided, and experience has proved that it should not be attempted. A heavy planing machine, that came within the experience of the writer, was placed upon a solid stone pier with the feet imbedded in mortar. The most skillful operator could not turn out smooth work, from the fact that after running for an hour or two, the cylinder journals would be found loose in the boxes, and, as a consequence, the lumber would be wavy upon the surface. I suggested the idea that it was possible that machinery might stand too solid, as well as not solid enough, and recommended placing a piece of soft wood one-half inch thick under each foot of the machine. This was done, and from that time the machine never failed to turn out good, smooth work.

Another class of vibrations in this, as well as other fast-running machinery, is caused by the unbalanced heads or pulleys. Vibrations of this class are not only unpleasant and frequently communicate themselves to the whole building, but are also injurious to the machine and detrimental to its work. They may and should be avoided. An unbalanced pulley upon the line shaft in a mill running at a uniform speed will often cause more vibrations and oscillations to the building than all the other machinery combined. The frame work of all machines, no matter whether it be a planing machine or a roller mill, should be sufficiently heavy and so proportioned as to successfully resist all ordinary vibrations, as far as it is practicable to resist them. That is to say, that while vibrations, to a certain extent, can not be avoided, yet there should always be sufficieut strength and solidity in the frame work so that those vibrations will not affect the working qualities of the machine. When the frame work is weak, so that the natural vibrations become a tremble, the good working qualities of the machine will often be found defective; while that tremble where a uniform motion is kept up will act as an impulse to the pendulum, and communicate itself to all parts of the building.

Where a number of machines are placed upon the same floor of a room, and all running at the same uniform speed, should the vibrations to the building become unpleasant and prejudicial to the working of other machinery in the same building, it may, in a great measure, be obviated, if not entirely cured, by changing the speed of each machine slightly, which, in a majority of cases, may be done without material detriment to the work, so that no two machines of the same kind will run exactly the same speed. In that manner, the vibrations started by one machine will be, to a certain extent, broken up by the others and not communicate the same to the buildings. With the judicious arrangement of the several machines in a mill in the manner suggested, and with sufficient care in the balancing of all fast-running pulleys and other parts of the machinery that run at high speed, there is no necessity for the amount of vibration that is found in many mills and other manufacturing establishments that is so frequently complained of.—[American Miller.

Heavily Increased Railroad Earnings.

If gross railroad earnings returns are any index to the condition of general trade, the returns for May are indicative of great activity. Certainly the ratio of gain, shown in May, over a year ago has, considering the number of roads reported, rarely been exceeded of late years, and has not been equaled at all this year. Even the favorable showing made in April has been eclipsed by the month just closed, and the same is true of January's heavy gain. The returns show that freight and passenger rate troubles in the sections affected have been largely lost sight of in the heavy volume of traffic handled by all roads. At the South, the cotton crop movement, as is usual at this period, is light, but the remarkable activity in industrial lines, and the subsidence of the floods in most sections, is reflected in very heavy gains, both individually and collectively, in the Southern States. The situation in the Southwest continues as before, the strongest feature in the exhibit reflecting a heavy traffic, and little or no effect from rate troubles west of the Mississippi. The Pacific roads closely approach the Southern group in percentage of gain. The low rates ruling West have evidently not favored water transportation, at least the reports from most of the companies contiguous to the lakes and canals show little effect from water competition. Contrasting sharply with the general prosperity of railroads in this country are the three Mexican companies reported, each of which shows a decrease.

The total gross earnings of 137 railroads, for the month of May, aggregate $35,493,025, a gain over the same month last year of $4,488,897, or 14 47 per cent. The gain in April this year over last was less than 14 per cent., and the gain shown last month over May a year ago, followed a gain of 6.6 per cent. in May, 1889, over May, 1888. The heaviest gain shown was made by the companies in the Southwestern group, viz.: 22 per cent.; the Southern and Pacific groups are next, with gains of respectively, 20 and 19 per cent. The granger group also shows a large increase, 15.5 per cent., while the Eastern roads gain 12, and the Central Western companies 10.5 per cent., and the trunk lines are last, with a 7 per cent. gain. The only loss shown is that of the Mexican group, 4.7 per cent. Detailed figures for May show that out of 137 companies reported only 20 (about one-seventh) had decreases from last May's totals.—[Bradstreet's.

Against Water Gas.

"The Fuel of the Future" was the title of a recent essay by Geologist Shaler, of Harvard College. He thinks coal must go, and that the supply of natural gas is unreliable. He says:

"The invention of water gas seems to provide an art by which we may hope to supply a vaporous fuel at a cost which will little exceed the average in tax laid upon consumers by the companies which pipe the rock gas to many of the Western towns. This form of fuel is produced by passing steam through large vessels containing incandescent carbon, in the form of coke or anthracite coal, and the result is a mixture principally composed of one atom of carbon and one of oxygen, known as carbonic oxide, together with hydrogen. The water of the steam is, in fact, decomposed, the oxygen combining with the carbon, and the hydrogen remaining uncombined."

This is all very well from a purely mechanical point of view, but there are reasons, sound ones, too, which may be urged against the future claims of water gas either as fuel or lighting. This very carbonic oxide which he speaks of is a rank, a deadly poison, the more dangerous because, unlike carbureted hydrogen gas, it has no odor, and defective feed pipes are not easily detected. We would call to the Professor's attention the disclosures made some years ago, concerning the Tessie de Motay process, of which he is evidently speaking. Investigation by the municipality of Paris discovered 13 times as much carbonic oxide in water gas as is to be found in carbureted hydrogen gas, and, in consequence, prohibited its manufacture or sale within the limits of Paris. There is reason to believe that workmen could not keep their health and strength where it is employed.—[Safety Valve.

Hydraulic Lifts.

Water has no virtue of its own as a source of power; for all practical purposes it is capable both of compression or expansion. It serves to convey any pressure or power which may be given to it, whether that pressure is a pumping engine at the end of a main or by means of a column or weight of water above the main contained in a lofty tower or high storage reservoir. One cubic foot of water weighs 62½ pounds, and if the height of the column is increased, the pressure upon the base is increased for every foot thus added, a further 62½ pounds. A column of water one square inch in area at base and 2.3 feet high weighs exactly 1 pound, so that for every increase of height of 2.3 feet a pressure of 1 pound per square inch is added to the base.—[Ex.

AT the Bookwalter Experimental Works, Springfield, O., new appliances are being prepared which will permit the metal to be poured directly from the converter into the molds without teeming it in pots. The slag is separated by an ingenious device.

THE WROUGHT IRON PIPE TRADE.

Few industries have made the progress in the last ten years that the wrought iron pipe business has. In speaking of advancement, both in number of mills and the volume of production, Ralph W. Carroll, of the American Tube & Iron Co., Pittsburgh, said:

Ten years ago there were 12 manufacturers of wrought iron pipe and tubes in the United States. They were the National Tube & Iron Co., Morris, Lasker & Co., Spang, Chalfant & Co., Allison & Co., Reading Iron Works, Syracuse Tube Co., Conshohocken Tube Co., A. M. Byers & Co., Crescent Tube Works (now the Pennsylvania Tube Works), Curtis & Co. and Crane Bros. The daily capacity at that time is estimated to have been about 1,200 tons daily, and the average output about 1,000 tons. The development of new oil fields in Warren county, Pa., and Cattaraugus and Allegany counties, N. Y, early in the '80's, caused an increased demand for pipe, which was augmented considerably in 1882 and 1883 by the commencement to utilize natural gas largely in these sections. Later, say from 1884 and up to the present, there has been a very large development of the natural gas industry around Pittsburgh, and also through Indiana, Ohio and Kentucky. Through this time the wrought iron pipe trade received a wonderful impetus, and a large number of new mills were erected to supply the increased demand, and the old ones added to their capacities.

The new mills erected since 1880 are: The American Tube & Iron Co., at Youngstown, O; Oil City Tube Co.; Paige Tube Co., Warren, O; Riverside Iron Works, Wheeling; Tyler Tube Co., Boston; Pittsburgh Tube Works; Continental Tube Works, and the Duquesne Tube Works. The daily capacity of the mills of the United States is now about 2,000 tons, and the demand at times has been so active as to tax their capacities. Just now there is barely enough demand to keep the mills comfortably filled, and the present average output could be largely augmented. The greatest amount of the increased demand is due to natural gas, and from the present outlook the wrought iron pipe manufacturers will secure a large business through the same channel for years to come. There have been millions of dollars invested in oil lines during the past ten years. The largest continuous lines of wrought iron pipe in the world are the two 6-inch lines of the Standard Oil Co., running from Olean, N. Y., to Bayonne, N. J., a distance of over 350 miles, and the 8-inch line from Lima, O., to Chicago, which is estimated to have cost $1,500,000.

ON THE NEW METHOD OF EXPLODING BOILERS.

Numerous items have appeared in the daily papers with reference to a recently discovered cause of boiler explosions, and we have been asked to give our opinion concerning this alleged cause. As nearly as we can learn, Mr. Fowler took a small copper boiler with a long nipple at one end, partly filled it with water, and placed it over a lamp. When the pressure had reached 40 lbs. he removed the boiler from the lamp, shook it up well, and inverted it. The pressure rose at once to 80 lbs. He did the same thing with a larger boiler, except that the initial pressure was 80 lbs., and the final pressure 180 lbs.

It is claimed that the rise in pressure so produced is due to the presence of gases in the boiler. To prove this an opening is left in the boiler until steam blows through it freely. The opening is then closed and the boiler shaken and inverted, when it is found that the pressure does not rise as before.

There is no doubt but that the facts are as stated above. We have repeated the experiments many times ourselves. The explanation, however, is not hard to find. When the boiler is first heated it contains a considerable amount of air, which the lamp does not warm to any considerable degree, most of the heat being absorbed by the water. When the boiler is shaken up the hot water mingles with the air, heats it, causes it to expand, and raises the pressure. In fact, the exact amount by which the pressure will be raised may be readily calculated.

It will be seen that the shaking up of the boiler is a necessary factor in the experiment; and as people do not usually shake up big boilers very much, there is little likelihood of an accident occurring in practice from this cause. Moreover, it should be remembered that getting up steam, in actual practice, is a slow operation; so that whatever air there is in the boiler has ample opportunity to become heated to the same temperature as the water; and when it has become heated to this temperature, any amount of shaking up could not raise the pressure a single pound.

Mr. Fowler's experiment is very interesting, but it need give our readers no apprehension.—[The Locomotive.

How Steel Rules are Made.

The London *Machinery Market* says: There are few branches of the engineering trades that require the exactness and precision requisite in the manufacture of steel rules, standards, and measuring instruments.

Accuracy and reliability are the two absolute essentials. In the general practice, the steel blades, after being prepared by being ground, glazed and tempered, are coated by an acid-resisting varnish, specially made to suit the requirements of the trade, for upon this depends, in a great measure, the clearness of the divisions when etched. The varnish being dry, the blades are placed upon the table of a pentagraph, which might well be termed a copying machine, as its work is to transfer to the steel blades, in a diminished size, any marks, letters or figures that may be traced from the copy. The latter is a plate of thin zinc, or any suitable metal, usually four times larger than the rules to be made, the divisions, figures, and letters all being made four times larger than they are required to be when engraved upon the steel blades; the object of this increased size being to diminish any imperfection that may exist upon the copy. There is a tracer connected by a system of steel bands and pulleys to the table so constructed as to move in two opposite directions at right angles to each other. Above the table are fixed two rows of holders, each having a diamond point; these holders are raised and lowered at the will of the operator by a treadle, so that both divisions, figures and letters are traced from the copy and transferred, in a diminished proportion, to the steel blades. The diamond points being required only to cut through the varnish, the blades are taken from the machine and etched, the acid burning away the steel wherever the diamond point has been traced.

WHY IRON RAILS IN USE DON'T RUST.

Mr. W. Spring seems to have solved the question why rails in use are less apt to rust than when stocked. In a paper in *Bulletin de la Societe Chimique de Paris* he ascribes this protection to the layer of rust on the surface of the rails which is exposed, while moist or wet, to the pressure or friction of the train wheels. Ironoxidhydrate Fe_2OH is under such conditions transformed into ironoxiduloxyd Fe_3O_4, which gradually covers the rail-top as a black gray film, and in contact with metallic iron becomes positive-electric, making the iron negative electric. Thus the same causes are at play here which produce the "passiveness" of iron. A common instance of the "protective" effect of a positive-electric body in contact with iron are the zinc-lined iron tubes which, when sunk in an oxidizing medium, show the positive-electric zinc exclusively affected. If a piece of iron in contact with zinc is put down in dilute sulphuric acid, the zinc will be dissolved, the liberated hydrogen collects on the surface of the iron and withdraws it from the attack of the acid. Ironoxiduloxyd proves accordingly diametrically opposite to ironoxidhydrate which, when in contact with metallic iron, becomes negative-electric, makes the iron positive-electric and consequently promotes its oxidation.

Mr. Spring, in order to verify his suppositions, brought a mixture of a slightly moistened ironoxidhydrate and small iron plates, scoured and polished, in a cylinder and subjected it to a pressure of from 1,000 to 12,000 atmospheres. The examination of the pressed mass showed that a firmly adhesive black layer of magnetic ironoxiduloxyd of a thickness of about 0.5 millimeter had formed on the surface of the iron plates, and, further, that the plates had been noticeably attacked—indicating that the formation of ironoxiduloxyd had been caused by combination of ironoxidhydrate and a part of the underlying metallic iron. A direct examination of the black, small scales that can be separated from the surface of the rail-tops, proved the presence in them of ironoxiduloxyd beside ironoxidhydrate and metallic iron in different quantities.

Hardening Steel by the Glycerine Process.

A paper on the subject of tempering steel, says the London (Eng.) *British Manufacturer*, was read before the London section of the Society of Chemical Industry, by Mr. Watson Smith, lecturer in chemical technology in University College, London. The new method in question is the invention of Captain G. Feodossieff, of the Imperial Russian Navy, St. Petersburg, inspector of all metals used in the naval construction in the Imperial Arsenal. In this process protected by letters patent in this country (No. 9457, June 28th, 1888), glycerine is the subject or medium proposed, and it is employed for the hardening, tempering or annealing of steel, cast steel, or cast iron. The lecturer referred to the British Association address of last year, 1889, by Prof. W. C. Roberts Austen, chemist to the mint, where he has referred to the confusion at present existing in the use of the words "hardening," "tempering" and "annealing" as applied to steel, the outcome being the following: "Hardening is the result of rapidly cooling a strongly heated mass of steel; tempering, that of reheating the hardened steel to a temperature far short of that to which it was raised before hardening—this heating being followed or not being followed by rapid cooling; whilst annealing consists in heating the mass to a temperature higher than that used for tempering and allowing it to cool slowly."

The Multiplying Uses of Iron.

Iron is the gauge by which the prosperity of this country is measured to a great extent—when the price of iron is in the ascendency the country is enjoying prosperity. The great rolling mills of the West that a few years ago were turning out tons of steel rails every hour, are heard of no more. They are supplanted by the great foundries that are turning out hundreds of tons of castings daily for the great office buildings and stores that are now being erected in large cities. To the ordinary beholder these buildings are built of stone, brick, terra-cotta and glass, but, in fact, the entire skeleton is of iron or steel, and all other materials are merely masks with which to clothe the monster. The buildings constructed on the principal of a laticed girder or braced tower. The brick or stone work shown is a mere shell or architectural veneer to give the building a resemblance to its neighbors. As we are apparently only at the beginning of this new era in architecture, it is probable that the demand for iron and steel for these monster buildings will continue at an increasing rate. —St. Louis Contractor and Builder.

Rail-Testing Apparatus.

Some very interesting experiments have recently been made at the Northern Railway Co.'s depot, at Ermont, with the electro-mechanical apparatus called the "schiscophone," the invention of Captain de Place, for testing the soundness of rails. This apparatus consists of a microphone and telephone combined with a mechanical "striker," and an induction audiometer. It is said that the instrument may be relied on to reveal any latent defect in the metal, and certainly the experimenents made at Ermont go far to prove the statement. Wherever a fault was indicated the rail was broken, and invariably the fault was found to exist. The minister of marine sent an engineer to be present at these experiments, with a view to ascertain whether the instrument could be effectively applied to the detection of defects in screw shafts.—[Glasgow Engineer.

INDUSTRIAL SUMMARY.

New Enterprises :—

It is stated that Shea & Strahle will erect new boiler works at Chattanooga, Tenn.

S. K. White, 74 to 88 Market street, Chicago, Ill., is about to put up a large machine shop and foundry.

The Pioneer Mining & Manufacturing Co., Birmingham, Ala., will, it is reported, build pipe works.

It is reported that the Pioneer Mining & Manufacturing Co. will build pipe iron works at Thomas, Ala.

A foundry and machine shops will be established at Florence, S. C., by the Carolina Real Estate & Investment Co.

The Haley Foundry & Machine Works—capital stock $20,000—have filed articles of incorporation at Sioux City, Ia.

The L. L. Culver Manufacturing Co., of St. Louis, Mo., has filed articles of incorporation, with a capital stock of $100,000.

The New Orleans & Cherokee Iron Manufacturing Co. is the name of the company which will build a 50-ton iron furnace at New Birmingham, Va.

It is reported that Thomas Evans has purchased the old water-works plant at Chattanooga, Tenn., and will convert the same into a foundry and machine shop.

A $50,000 stock company has been organized, with C. B. Parker, general manager, to build car wheel works at Bluffton, Ala. Capacity is to be 200 wheels per day.

It is stated that W. H. Woodward and others, of Birmingham, Ala., have organized a stock company, and will at once commence work on a 100-ton furnace, at Clarksville, Tenn.

The Piedmont Machine & Foundry Co. has been organized at Piedmont, Ala., and the contract for building the plant let. Car wheel boxes of an improved kind will be manufactured.

H. S. Chamberlain, O. L. Hurlbut, T. H. R. McIntyre and others have incorporated the Chickamauga Iron Co., at Chattanooga, Tenn., with the privilege of erecting and operating blast furnaces.

The Howard-Harrison Iron Co., with a capital stock of $500,000, has filed its articles of incorporation, and has begun to erect works at Bessemer, Ala., which, when complete, will employ 800 men.

The Griffin (Ga.) Foundry & Machine Works have been organized with $40,000 subscribed capital, and the following officers: C. H. Osborn, president; J. D. Boyd, vice-president, and R. H. Drake, secretary and treasurer.

The Auburn Stove & Foundry Co. has been organized at Auburn, Me., by the choice of H. W. Hutchins, president, and J. R. Learned, treasurer. Capital, $50,000. The plant of the Biddeford Stove Co. will be removed to Auburn.

A stock company of whom J. K. Kyle, President; J. M. Thomson, Vice. president, and B. A. Thompson, Secretary, have purchased the Birmingham Safe & Lock Works, at Birmingham, Ala, for $90,000, and will operate them.

The Pratt & Whitney Machine Co., of Hartford, Conn., has recently purchased a large lot of land from the Singer Sewing Machine Co., which includes a tract 295x100 feet. The company intends to build on this ground before long.

The Orange Lake Manufacturing Co., recently incorporated by F. A. Gardner, G. W. Wilson and others, to erect a foundry and machine shop at Orange Lake, Fla, has, it is stated, decided to locate in Ocala, and will employ 50 or 60 operatives.

A corporation to be known as the Messinger Valve Co. has been organized at Kittery, Me., for the purpose of manufacturing and selling valves. The officers are: President, Wm. T. Messinger, of Revere, Mass; treasurer, Geo. D. Wildes, of Ipswich, Mass.

The Memphis Equipment Co., having a capital of $1,000,000, has been incorporated at Kansas City by Nathaniel Thayer, of Boston; George H. Nettleton, of Kansas City, Mo., and others, to build cars upon the car trust plan for the Kansas City, Fort Scott & Memphis and the Kansas City roads.

The Trip Giant Leveler Co. has been organized at Portland, Me., to manufacture machinery for shaping and leveling boots and shoes. The concern has a capital stock of $120,000, and its officers are: President, Charles A. Snow, of Boston, Mass.; treasurer, Edward P. Adams, of Cambridge, Mass.

The Great Western Iron & Steel Co. have filed articles of incorporation at Seattle, Wash. The objects of the company are stated to be to lease or own iron, coal and other mines, and to build foundries, rolling mills and works for the manufacture of coke, etc. The capital stock of the company is placed at $1,000,000, divided into 10,000 shares.

A rolling mill for the manufacture of merchant bar iron from scrap is being built at Fort Worth, Tex. It is to be called the Texas Rolling Mill & Iron Works, and will have a daily capacity of about 40 tons. The officers are: G. E. Beach, president and general manager; J. G. Williams, vice-president; H. Schwartz, secretary; E. H. Keller, treasurer, and P. H. Durack, superintendent.

A West Superior special to the Milwaukee *Sentinel* says: W. F. Mattes, superintendent of the West Superior Iron & Steel Co., has let the contract for the construction of the iron building for the Bessemer department of the plant, together with all the machinery that the company cannot conveniently manufacture at the present time, to the Pittsburgh Iron & Steel Engineering Co. Work will be commenced as soon as the foundation is in readiness to receive the walls.

Gen. J. T. Wilder and other capitalists, of Chattanooga, Tenn., have completed the purchase of 12,000 acres of iron ore and coal lands, and 4,800 acres town site property, to be the basis of a big development. The town-site includes Crawfish creek, with the water works supplying Chattanooga, and is immediately adjacent to the proposed Chicamauga National Park. The syndicate will build coke ovens, furnaces, immense hotel, and provide other appointments of a city.—[Manufacturers' Record.

The Holyoke Hydrant & Iron Co. has been organized with a capital stock of $40,000, and these directors: Aaron Bagg, C. E. Torrance, T. H. Fowler, C. F. Smith and E. P. Bagg. C. E. Torrance is president, and C. F. Smith is at present secretary and treasurer, but the position will soon be held by George S. Parsons, recently of Kalamazoo, Mich. The company now employ 85 men, with a monthly pay-roll of $3,000, and does a large business making fire hydrants, paper mill calenders, platers, dusters, elevators, shafting, pulleys and hangers.

The following are among the new companies granted licenses of incorporation in Illinois: American Novelty Co., Chicago; to manufacture patented articles; capital, $50,000; incorporators, E. S. Boynton, H. H. Chandler, H. E. Chandler.—Arnold Refrigerator Car Co., Chicago; to manufacture refrigerator cars; capital, $10,000,000; incorporators, A. Bierbower, J. W. Merriam, Robert Van Sands.—International Hydraulic Co., Chicago; to manufacture hydraulic apparatus; capital, $2,000,000; incorporators, William E. Shaw, James E. Gookins, J. F. Stevens.—Cavern Mining Co., Chicago; to do a mining business; capital, $500,000; incorporators, L. E. Fitts, E. T. Noonan and J. E. Fay.—Bird-Turnbull Manufacturing Co., of Chicago; to manufacture wire fence; capital stock, $35,000; incorporators, Jessie Bird, G. A. Turnbull and Palmer Splading.—Kenwood Bridge Co., Chicago; to manufacture and sell iron and steel bridges; capital, $100,000; incorporators, F. W. Baker, Paul Willis, and G. W. Murray.—Chicago Refined Metal Co., Chicago; to manufacture and sell metals; capital stock, $200,000; incorporators, H. P. Benton, J. S. Ward, Gordon McDowell.—Chicago Heat Storage Co., Chicago; to manufacture appliances for producing storage heat; capital stock, $600,000; incorporators, C. G. Singer, F. W. Melick and John Le Boutillier.

Enlargements, Additions, Removals, Etc.:—

It is possible that the Minnesota Iron Co. will build a rolling mill at West Duluth, Minn.

The Jennings & Griffin Manufacturing Co., of Valesville, Ct., are to build an addition to their factory.

The Kilby Manufacturing Co., Cleveland, O., will build additions to its machine shop, 60x60 feet, and 50x100 feet.

It is reported that a site being donated, the Johnson Axle Co., of Richmond, Va., will build a foundry at Manchester, Va.

The Ensign Car & Manufacturing Co., at Huntington, W. Va, will build an addition 70 x 70 feet to its blacksmith and machine shops.

It is stated the Henderson Steel & Manufacturing Co., of Birmingham, Ala., is having plans prepared for the erection of another furnace.

The Morgan Manufacturing Co., of Spartansburg, S. C., will increase its capital stock to $15,000, and, it is reported, establish an iron foundry and brick yard.

It is reported that a Chicago firm will locate its malleable iron works upon the land of the Radford Development Co., at Radford. The capital stock is said to be $150,000.

The Brosius Motor Sewing Machine Co., at Atlanta, Ga., will at an early date enlarge its factory and add new machinery, increasing its capacity to about 100 machines per day.

The Richardson Saw Works at Newark, N. J., have been sold to a syndicate for $500,000. The new concern will be known as the American Saw Co. The Richardson Brothers' saw manufactory was started in 1860.

At a meeting of the directors and stock holders of the Western Automatic Machine Screw Co., of Elyria, O, it was decided to erect an additional building to provide for the necessary facilities to meet its rapidly growing trade. Work on the new building will be commenced soon.

The Fuller-Warren Stove Works, of Albany, N. Y., will remove to Milwaukee, Wis. The conditions under which they will remove their extensive works are that if $200,000 of Milwaukee capital was furnished that they would be prepared to duplicate the investment or as much more as was subscribed. The amount has been subscribed and arrangements will be completed soon.

Furnaces and Works Starting Up:—

The Walworth Manufacturing Co., of Boston, Mass., which has leased a portion of the Continental Tube Works plant, at Pittsburg, Pa., started up last week. The company manufactures tubular poles for electric street railway wires.

Fires and Accidents :—

The Ames Thresher & Reaper Works in Oswego, N. Y., were struck by lightning and totally destroyed. Loss, $20,000; partially insured.

On the morning of the 10th the entire works of the Monongahela Mfg. Co., at Monongahela City, Pa., consisting of a foundry, machine shop and pattern rooms, were completely destroyed by fire. The loss to the company is estimated at $40,000, partially covered by insurance. It is not known as yet whether they will rebuild.

General Industrial Notes:—

No. 3 Furnace, of the Carbon Iron Co., at Parryville, Pa, produced 452 tons of No. 1 foundry iron, week before last. The largest former yield was about 350 tons.

Recently Byram & Co., of Detroit, shipped a 7 foot Colliau cupola to the Union Pacific Railway, at Omaha, Neb, and a 6-foot cupola of the same type to the J. D. Smead Co, of Toledo, O.

W. W. Brisben, Cleveland, O., recently made a shipment of his emery wheel dressers to the British Government machine shops at Melbourne, N. S. W. He has gained quite a reputation for his dressers and is shipping them all over the world. He has a large number of orders on hand.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 27th day of June, 1890, for furnishing and putting in place complete the iron floor, ceiling and roof construction, iron columns with terra cotta covering, brick

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and terra cotta floor and ceiling arches, sky-lights, constructive iron work of stairs, wood sheathing, terra cotta tiles, slate and copper work of roofs, down pipes, etc., required for the United States Court House and Post Office building at Birmingham, Ala.

On the 9th inst. the plant of the Spaulding Iron Co., at Brilliant, Jefferson County, O., was put up for sale at auction. The amount required to start the bidding was $88,666.67, and this amount was not offered. The mill will be advertised for 30 days and offered for sale again.

The turnbuckle department of the Central Iron & Steel Co., of Brazil, Ind., is running night and day to supply the large demand for their patent wrought iron turnbuckles. The company has been obliged to put in additional machinery in order to supply the rapidly increasing demand for this meritorious article, and they are now prepared to furnish a large variety of sizes.

To any of our readers who use asphaltum or other blacks for iron work we would advise an investigation of the claims of the Nubian Iron Enamel Co., 254 W. Jackson St., Chicago, who say they guarantee every gallon of goods which leaves the factory to give satisfaction, or will take them back and refund freight and all other charges which it has cost the consumer to make a trial. And the fact that every evidence points to a rapidly increasing business would indicate they know they can safely make the promises they do.

Wilbur F. Goodspeed, of Cleveland, special master commissioner appointed by the United States Court, was in Youngstown, O., on Friday, the 13th inst., and appraised the plant of Brown, Bonnell & Co. upon judgments obtained by creditors and advertised it to be sold on Tuesday, July 22. The property includes the Mahoning Iron Works, two blast furnaces, Falcon and Phœnix, and a large amount of real estate. The property is appraised at $972,-237. It is believed that it will be purchased by a syndicate of creditors, and will continue in operation.

The Porter Iron Roofing & Corrugating Co., 101 and 103 West Front St, Cincinnati, O., report that they have been doing a very large business since the Spring trade set in. The business thus far has been much larger than last year for the same period of time. In April they made shipment of order of 100,000 squares to New Orleans, La. Within a few days they have shipped one car load on an order for 60,000 squares to New York. Aside from the orders here noted they have had many orders for roofing in large and small quantities and still have many orders to fill, although it is now approaching the dull season of the year in their business.

The Baldridge & Hogan Saw Co., Nos. 9 Vine and 86 Water Streets, Cincinnati, O., are manufacturers of best English steel circular and long saws, also dealers in gummers, files, swages, emery wheels, leather and gum belting This company started in business in 1872 and have been doing a very good and increasing trade every year since. Thus far this years the orders have been more than in any previous year, and while it may be quieting down a little as the dull season of the year is coming on, they are having orders all the time A few weeks ago this company made a voluntary and very generous increase of wages to their workmen, and this was all the more appreciated by their employes inasmuch as they had not asked for it.

Personal.

Our old friend, Mr. J. F. Holloway, now of New York, made the address to the graduating class of Stevens Institute of Technology, Hoboken, N. J., at the recent commencement. We doubt if another graduating class of the season was favored with more practical wisdom or pleasing humor than was the class of '90, S. I. T.

July 4th Excursions.

On July 3d and 4th, 1890, the Cleveland & Canton Railroad will sell excursion tickets between all stations on this line at only one fare for the round trip, good to return until July 5th. Celebrations on a very large scale are being arranged at all principal stations, particularly at Canton, Cleveland and Zanesville, and this low rate will enable all to attend.

Interchangeable Mileage Ticket.

The Wheeling & Lake Erie Railway has prepared and placed on sale at its principal stations commercial tickets, 1,000 miles, good over 18 different roads, for the accommodation of its patrons. These tickets, with full information as to the territory they cover, can be obtained by calling on any agent of the Wheeling & Lake Erie Railway. Small stations not provided with a stock of this issue, will be authorized to receive orders for same, making requisition on the general passenger agent for what may be required.

4th of July Excursion.

Continuing its usual custom the Wheeling & Lake Erie Railway Co. will offer to the public excursion rates of half fare from all stations to all stations, July 3d and 4th. Excursion tickets will be sold on dates named with limit for return passage good including July 5th. Children under 5 years of age free between 5 and 12 years, quarter fare.

Fourth of July Excursions via the Pennsylvania Lines.

Excursion tickets will be sold at one fare for the round trip between all stations on the Pennsylvania Lines west of Pittsburg, on July 3d and 4th, good returning until July 5th. No excursion tickets will be sold to adults at less rate than 25 cents, nor to children at less rate than 15 cents.

CLEVELAND & CANTON 4th of July excursions to all points. One fare for the round trip, good to return until July 5th.

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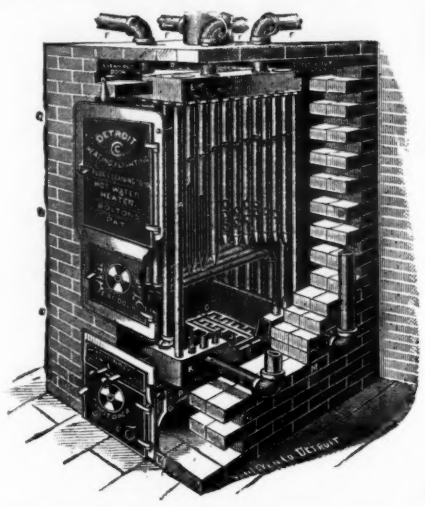

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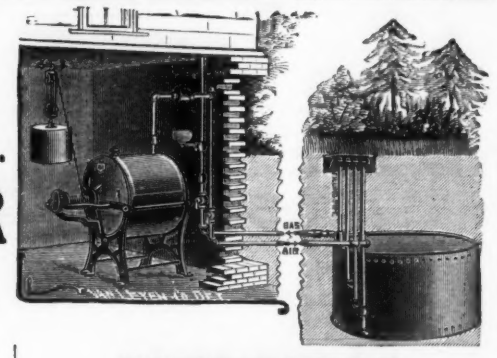

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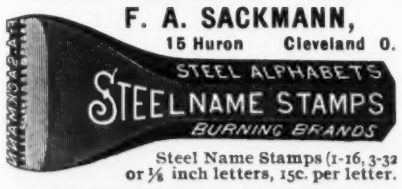

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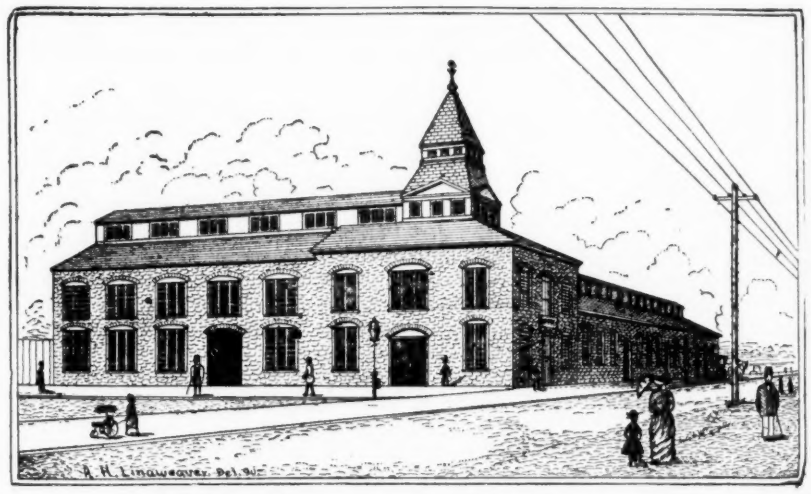

NOTICE--Master Commissioner's Sale.

DAVID RUMMELL, against THE AMERICAN NAIL & MACHINE CO., et al. } Court of Common Pleas, Hancock County, Ohio.

In pursuance of an order of sale issued from the Clerk's Office of said Court of Common Pleas of Hancock County, Ohio, on the 13th day of June, A. D. 1890, and to me directed as Special Master Commissioner, in the case above named, I will expose at Public Sale, at the front door of the Court House in the City of Findlay, Ohio, on

TUESDAY, JULY 22, A. D. 1890,

at the hour of two o'clock P. M. of said day, the following Real Estate, to wit:

Inlots numbers 7032, 7033, 7034, 7035, 7036, 7037 in the South Highlands Addition to Findlay, Ohio.

Also inlots numbers 7198, 7199, 7200, 7201, 7202, 7203 in the Burt Addition to said city, together with the Foundry, Nail and Machine Shops erected thereon, with Machinery, Engines, Boilers, Tools, Fixtures, Franchises and Privileges to the same belonging or in anywise appurtaining.

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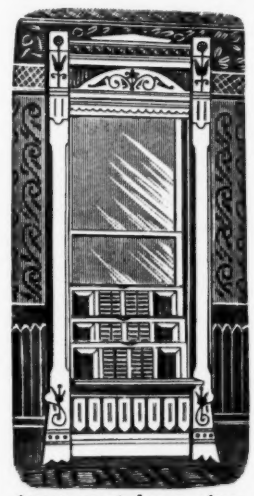

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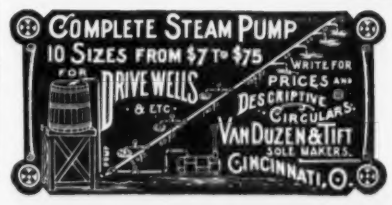

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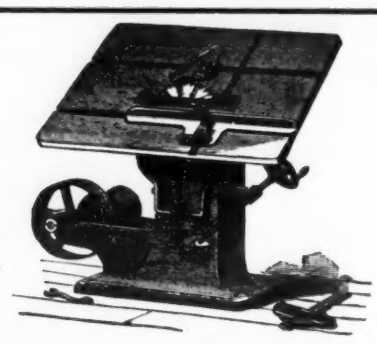

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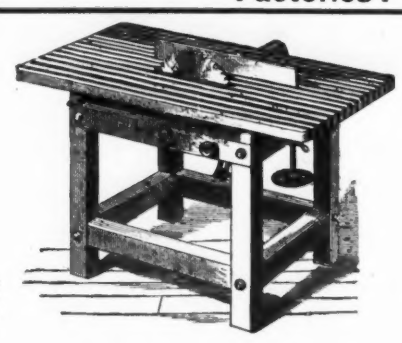

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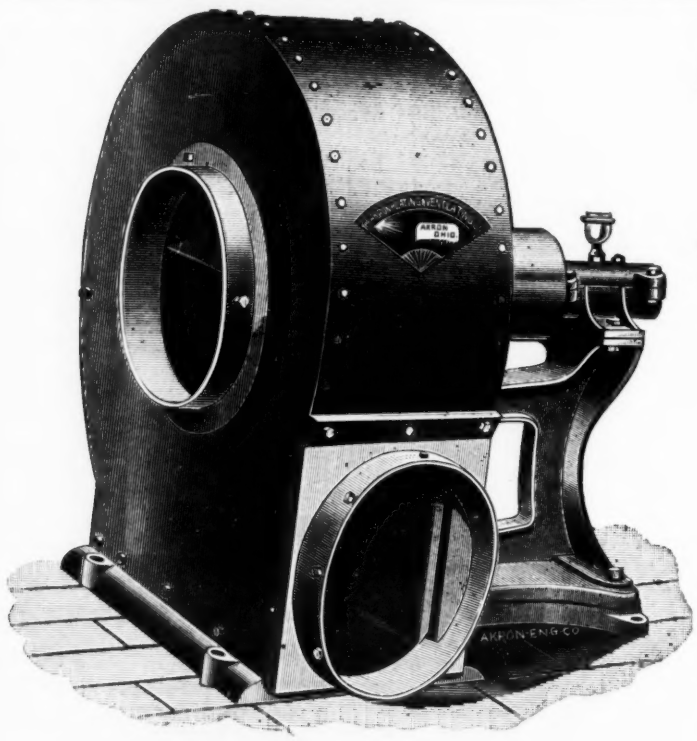

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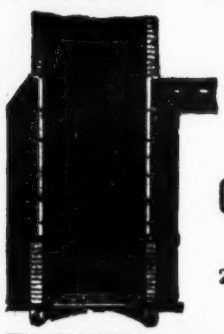

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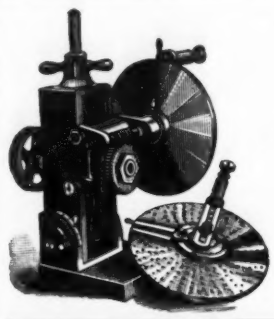

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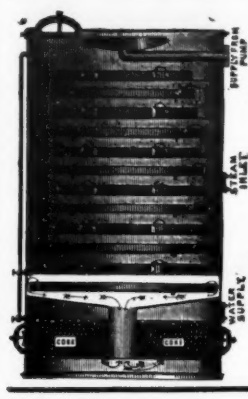

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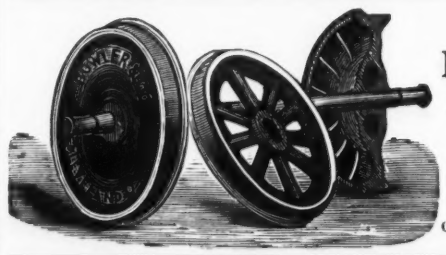

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DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $20 50@21 00; Lake Superior (coke) Bessemer, $20 00@21 00; Katahdin (Maine charcoal), $24 00 @25 00; Lake Superior Coke, Foundry, all ore, $19 25@20 75; Lake Superior Coke, Foundry Cinder Mixed, $18 00@19 00; Standard Ohio Black Band, $18 75@19 25; Southern No. 1, $17 00@17 50; Southern Gray Forge, $15 25@ 15 50; Jackson County (Ohio) Silvery, $18 50@ 19 00; Old Car Wheel, $20 00@00 00.

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1 & 1¼ by ⅜ to ¾ inch	2 05
⅝, ¾ and ⅞ by ⅜ to ⅝ inch	2 25

Round and Square.

1 to 1⅜ inch	1 85
2 to 2⅜ inch	2 05
2¾ to 3¼ inch	2 35
3⅜ to 4 inch	2 85
4¼ to 4½ inch	3 35
4¾ to 5 inch	3 55

Oval.

⅞ to 1¼ inch	2 25
⅞ to ¾ inch	2 45
½	2 65
⅜	3 05

Half Oval and Half Round.

1¼ to 3 inch	2 95
⅞ to 1¼ inch	2 55
⅞ to ¾ inch	3 15
½	3 35
⅜	4 85

Heavy Band.

1½ to 6 by ¼ and 5-16 inch	2 05
1 to 1¾ by ¼ and 5-16 inch	2 15
¾ to ⅞ by ¼ and 5-16 inch	2 35
⅝ to ⅜ by ¼ and 5-16 inch	2 85

Hoops.

1¼ to 4, Nos. 13 to 15	2 65
1¼ to 2, Nos. 16 to 18	2 75
1¼ to 2, No. 19	2 85
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1¼ to 2, No. 21	3 05
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15-16, 1 and 1⅛, Nos. 13 to 15	2 85
15-16, 1 and 1⅛, Nos. 16 to 18	2 95
15-16, 1 and 1⅛, Nos. 19 and 20	3 05
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15-16, 1 and 1⅛, No. 22	3 25
⅞, Nos. 13 to 15	3 05
⅞, Nos. 16 to 18	3 15
⅞, Nos. 19 and 20	3 25
⅞, No. 21	3 35
⅞, No. 22	3 45
13-16, Nos. 13 to 15	3 25
13-16, Nos. 16 to 18	3 35
13-16, Nos. 19 and 20	3 45
13-16, No. 21	3 55
13-16, No. 22	3 65
¾, Nos. 13 to 15	3 35
¾, Nos. 16 to 18	3 55
¾, Nos. 19 and 20	3 65
¾, No. 21	3 75
¾, No. 22	3 85
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 75
11-16, Nos. 19 and 20	3 85
11-16, No. 21	3 95
11-16, No. 22	4 05
⅝, Nos. 13 to 15	3 85
⅝, Nos. 16 to 18	4 05
⅝, Nos. 19 and 20	4 15
⅝, No. 21	4 25
⅝, No. 22	4 35
⅝, No. 23	4 55

Light Band.

1⅛ to 6 by 1/16 to 3-16 in	2 25
1⅛ to 6 by Nos. 11 and 12	2 35
1 to 1⅜ by 1/16 to 3-16 in	2 45
1 to 1⅜ by Nos. 11 and 12	2 55
⅞ and 13-16 by 1/16 to 3-16 in	2 75
⅞ and 3-16 by Nos. 11 and 12	2 85
¾ and 11-16 by 1/16 to 3-16 in	3 05
¾ and 11-16 by Nos. 11 and 12	3 15
⅝ and 9-16 by 1/16 to 3-16 in	3 35
⅝ and 9-16 by Nos. 11 and 12	3 45
⅝ by ⅜ to 3-16 in	3 65
⅝ by Nos. 11 and 12	3 75

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 85
⅞ inch, " " " 13 and 14	3 05
¾ inch, " " " 11 and 12	3 15
¾ inch, " " " 13 and 14	3 35

Sheet Iron.

No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
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Above includes plates 90 inches wide.

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3⅛ to 4 in	11
⅜ to 11-16 and 4¼	10½
⅛ to 6 in	11½
¼ to 9-32 and 6¼ to 7 in	12
3-6 in	14

Flats.

	cts. ℔s
2 to 9-16 wide by 2 to ⅜ thick	0

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Hobson's "Best"	16c
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Cast borings	9 00
Uncut wrought iron boilers	13 00
Steel boiler plates	17 00
Grate Bars	9 00
Pipes and flues (Clean)	12 00
Tank iron	12 00
Hoop and band iron	9 00
Sheet iron	10 00
Wrought drillings	11 00
Malleable iron	10 00
	GROSS TONS
Old iron T rails	22 50
Old steel rails	19 50
Old car wheels	18 50
Old copper	℔ 10
No. 1 H. red Brass	11
Heavy yellow brass	8½
Light yellow brass	6
Scrap Zinc	
Tea Lead	
Heavy Lead	3¼

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PLATE STEEL.
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SMOKE STACK AND GASOMETER RIVETS.
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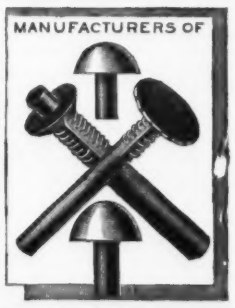

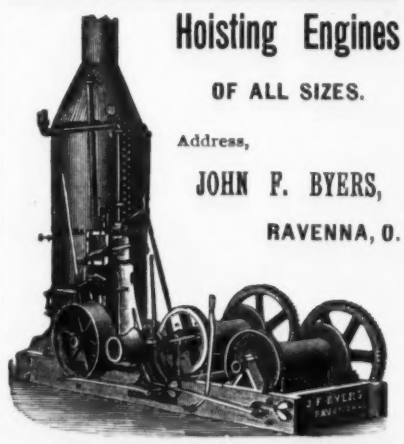

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OF ALL SIZES.

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MACHINERY SUPPLY MARKET.

Anvils.

American ..... ₩ lb 9@10
Wrights ..... ₩ lb 9¼

Bellows.

Blacksmiths' { Hill's ..... dis 40 / Bullock's .... dis 50&10
Moulders' ..... dis 40@40&10
Hand ..... dis 40&10@50

Belting.

Boston Belting Co's standard ..... dis 70@70& 5
" " " extra ..... dis 60&5@60&10
" " " best ..... dis 55
Hoyt's Short Lap ..... dis 45
Cleveland Rubber Co. extra standard ..dis 60&10
Shultz Raw Hide Leather Belting, single, ... dis 40
Shultz Raw Hide Leather Belting, double, and Light Double ..... dis 40
Standard, oak tanned ..... dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's ..... dis 20
Boston Blower Co., ... dis 35
Buffalo ..... dis 35

Borax.

..... ₩ lb 9¼@10¼

Chalk.

White ..... ₩ gross 50
White Crayon ..... ₩ gross 12@12½ dis 10
Red ..... dis 70
Blue ..... dis 85

Chucks.

Cushman's 4 Jaw Independent ..... dis 45
" Combination ..... dis 40
" Geared Scroll ..... dis 30
" 2 Jaw Brass Workers. ..... dis 30
" Drill ..... dis 35
Wescott's Scroll Combination ..... dis 33⅓
" Independent ..... dis 40
" Little Giant Drill ..... dis 30
Horton's Universal ..... dis 40
" Independent ..... dis 45
Whiton's Independent ..... dis 45
National Combination ..... dis 40
Sweetland " ..... dis 40
Skinner " ..... dis 40
" Independent ..... dis 45
Almond Drill ..... dis 20
Morse " ..... dis 15
Skinner's Combination Lathe ..... dis 33⅓
" Independent Lathe ..... dis 40
" Universal Lathe ..... dis 40
" Drill ..... dis 15

Cutters and Reamers.

Cleveland ..... dis 10@15
Pratt & Whitney ..... dis 10@15
Standard ..... dis 10@15
Brown & Sharpe, Milling Cutters ..... dis 15
" " Gear Cutters ..... dis 15

Crowbars.

Cast Steel ..... ₩ lb 4
Iron, steel points ..... ₩ lb 3½

Drill and Drill Stocks.

Twist drills ..... dis 50&10
Morse Taper and Straight shank to 1½" ..... dis 50&10
Morse Taper and Straight shank Larger than 1½" ..... dis 25
Drill Sockets ..... dis 25
Standard Twist Drills ..... dis 55@55&5
Cleveland " " ..... dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, C. F. F.
6 egs. ₩ lb	4 c	5 c	2½c
¼ kegs ₩ lb	4¼c	5¼c	2¾c
½ kegs ₩ lb	4½c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans, less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co. ..... dis 45@50
H. H. Barton ..... dis 45@50

Emery Wheels.

Detroit ..... dis 55@60
Norton's ..... dis 55@60
Grant ..... dis 55@60
Sterling ..... dis 60
Celluloid ..... dis 10&33⅓
Northampton ..... dis 55
Crystal ..... dis 65@70
Vitrified ..... dis 60
Vulcanite ..... dis 10&10

Files.

Nicholson ..... dis 60&10@60&10&10
" X. F. ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
Arcade ..... dis 60&10@60&10&10
Disston's ..... dis 65@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50

Hammers.

P. S. W ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list ..... dis 70

Nuts and Washers.

Size of bolt inches ¼ 5-16 ⅜ ½ ⅝ ¾ 1
Square 8 7 5½ 4½ 4 3½ 3¼
Hexagon 15½ 11½ 8½ 6 5½ 5¼ 5
Washers 9 8 7 5 4½ 4¼ 4¼
In lots less than 100 lbs, ₩ lb add ½c., lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887 ..... dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots ..... $2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin ..... dis 60
Brass and Copper ..... dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz ..... dis 70@10&10

Packing, Steam.

Boston Belting Co. ..... dis 60
American Packing Hemp ..... ₩ lb 10@11
Russia Packing " ..... ₩ lb 14
Italian Packing " ..... ₩ lb 13@14
Plumbago Piston ..... ₩ lb 40
Morrison's " ..... ₩ lb 50
Square Flax " ..... ₩ lb 50
Sheet Rubber ..... ₩ lb 12@24
Excelsior Rubber ..... ₩ lb 24

Picks.

Railroads, 5 to 6 lbs ..... $12 dis 60
" 6 to 7 lbs ..... $13 dis 60

Pulleys.

Iron Pulleys, Walker List ..... dis 45
Medart Pulleys ..... dis 55
Split Wood Pulleys ..... dis 55

Rivets.

Iron, Thousand, list November 17, ... dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17 ..... dis 50
Copper ..... dis 50@50&10

Rope.

Manilla, ½ inch and over ..... ₩ lb 15¾
Sisal, ½ inch and over ..... ₩ lb 13¾

Sand Paper.

B. A. & Co ..... dis 45@50
H. H. Barton's ..... dis 40@45
New England Flint ..... dis 40@50
Barton's Garnet ..... dis 20

Saws.

Disston's Circular ..... dis 45
" Band ..... dis 20
" Scroll ..... Net
Hack Saw Stubs ..... dis 20
" " Eureka ..... dis 20
" " Star ..... dis 20
Saw Swages Disston's ..... dis 20
Atkins' Cicular Saws ..... dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws ..... dis 40&10
" Silver Steel Diamond Cross-cut Saws ..... dis 70c per ft
" Dexter Cross-cuts ..... dis 50c "
" Diamond " ..... dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts ..... dis 32c "
No. 1 Handles ..... dis 23c per pair
No. 6 " ..... dis 16c "
Excelsior Saw Tools ..... $6 per doz
Perfection " ..... $15 "
Detroit Saw Works, Circular ..... dis 50
" " " Band ..... dis 25
" " " Mulay ..... dis 45

Screws.

Wood Screws—List Jan 27 1889

Flat head iron ..... dis 5
Round head iron ..... dis 40
Flat head brass ..... dis 45
Round head brass ..... dis 35
Square Cap ..... dis 65
Hexagon Cap ..... dis 60
Set C. H. C. P ..... dis 70
Machine, flat head, iron ..... dis 65
Machine, round head, iron ..... dis 65
Bench and hand—
Lag or coach ..... dis 75@75&10
Coach, patent gimlet point ..... dis 75

Shovels and Spades.

Ames' list November 1, 1885 ..... dis 20
Dennis ..... dis 5.25
Hussey & Binns, railroad ..... dis 8.00

Taps.

Cards, Hand and Nut to 2 in ..... dis 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps ..... dis 55
Pipe Taps to 2½ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 50
Pulley Taps ..... dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls	21c@29c	
No. 18 " " ¼ and ½ "	18c@28c	
No. 36 " " ¼ and ½ "	16c@27c	
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)	11½c	
3-Ply " 1 lb Balls	12@12¼c	
3-Ply " 1½ lb Balls	11@11¼c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@25
Prentiss ..... dis 20
Stephen's ..... dis 25@30
Barrett's ..... dis 30
Miller's Falls ..... dis 40
Merrill's ..... dis 10@15
Howard ..... dis 30

Wire.

	New List, Jan. 18, 1884
Brass and copper	dis 20@25
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis 65&5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	$6.00@lb dis 30

Wrenches.

Coe's genuine, cash in ten days ..... dis 50
Girard Standard ..... dis 70&10
Agricultural ..... dis 75&10
Mechanics' ..... dis 55&10,& 3
Bemis & Call's Combination ..... dis 35
Donohue's Engineers ..... dis 20&10
Lamson & Sessions Engineers ..... dis 60
Billings & Spencer's Drop Forged ..... dis 10
William's " " ..... dis 10
Alligator " " ..... dis 40

Improved Screw Cutting FOOT AND POWER LATHES

Drill Presses, Shapers, Band, Circular and Scroll Saws. Machinists' Tools and Supplies. Lathes on trial. Catalogue mailed on application.

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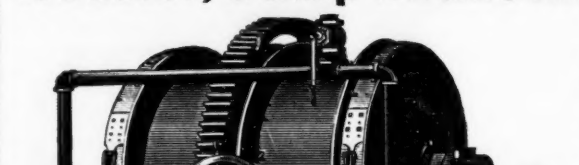

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Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

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LIGHT AND HEAVY
IRON CASTINGS.
DAILY MELTING CAPACITY 75 TONS-SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.
DUPLICATE WORK A SPECIALTY

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Detachable and Roller CHAIN BELTING,

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For handling materials of all kinds.

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PRICE $35.00.

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SEND FOR CATALOGUES.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩ doz $8 00
Others.....₩ doz $7 00
Full polished.....₩ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 70&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 70&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 70&5
Wrought, loose joint, broad.....dis 70&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 70&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 70&5

Chains.

Revised List.

Trace, 6½-10-2.....₩ pair 1.03
Trace, 6½-10-3.....₩ pair .92 .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ ℔5½@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11½ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hangers.

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Aussable, ₩ ℔	23	24	25	26	28	dis 25&10
Putnam, ₩ ℔	18	19	20	21	23	dis 15

Essex.....dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@⅞...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

Squares.

Steel and iron, Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
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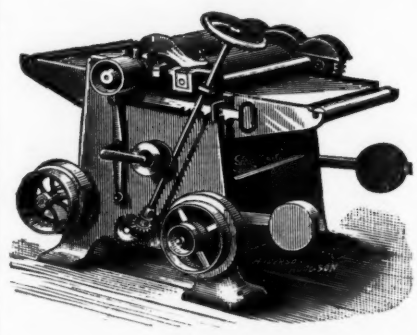

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2 35	"	Plain, side crank	275
1 25	"	Plain, center crank	260
1 20	"	Plain, center crank	240
1 20	"	Plain, side crank	180
1 16	"	Plain, center crank	180
1 14	"	Plain, side crank	100
1 12	"	Plain, center crank	125
1 12	"	Plain, side crank	100
1 10	"	Plain, side crank	100
1 8	"	Vertical	75

Boilers Complete.

75	H.-P.	Tubular	$500
70	"	Portable	500
60	"	Tubular	400
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30	"	Portable	325
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25	"	2 flue	150
35	"	Vertical Tubular	250
15	"	Vertical Tubular	160
10	"	Single flue	100
8	"	Single flue	95
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8	"	Tubular	110
10	"	Portable	125
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Boilers and Engines Complete.

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16	"	Portable, on skids	400
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14	"	Portable, on wheels	300
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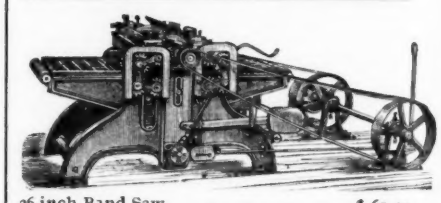

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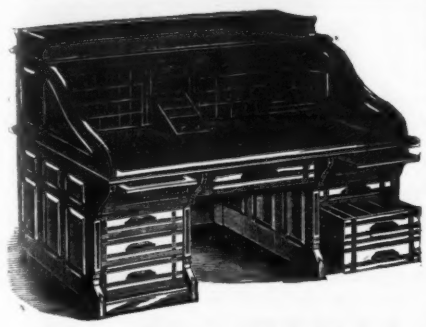

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Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
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Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

Trains marked * run daily.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA.

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 45 a m	*6 25 p m
Marietta Express.....	†11 15 a m	†2 25 p m
Valley Junction Express...	*4 15 p m	*10 25 a m
Cleve. and Canton Express	*7 05 p m	†8 20 a m

*Daily. †Daily, except Sunday.

J. T. JOHNSON, Gen. Supt. J. B. CAVEN, Gen. Pass. Agt.

From Cleveland Union Station.

PENNSYLVANIA LINES.

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

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Pullman Palace Sleeping Cars daily between Cleveland, Columbus and Cincinnati. City ticket office, Weddell House corner.

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No. 70, Pittsburgh Accom.....	*11 25 a m
No. 64, New York & Pitts. Limited...	* 2 50 p m
No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 45 p m
No. 73, Leavitssburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No. 75, Mantua Accom.....	* 7 20 p m
No. 69, Youngstown Express.....	† 9 10 p m

*Daily. †Daily, except Sunday.

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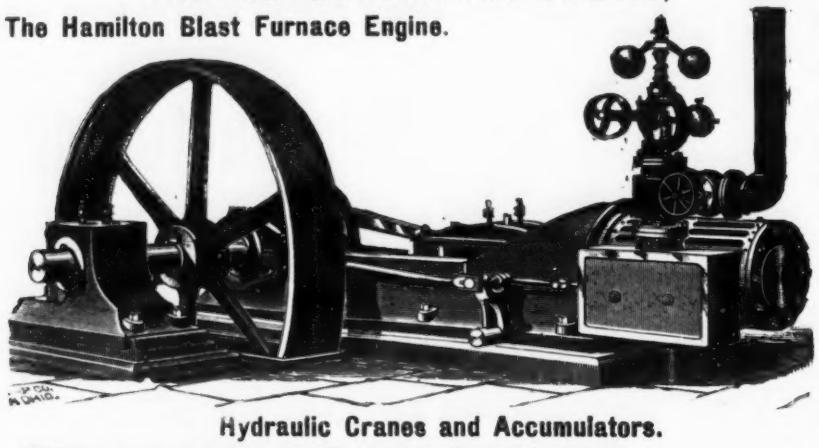

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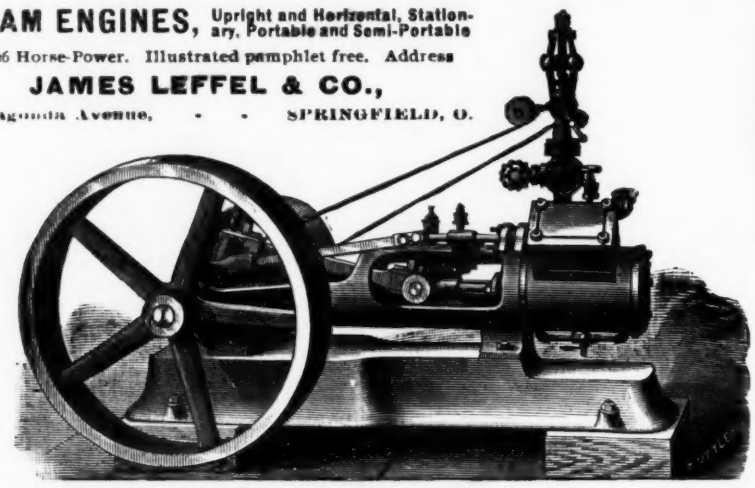

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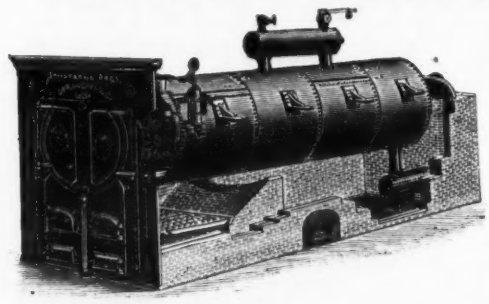

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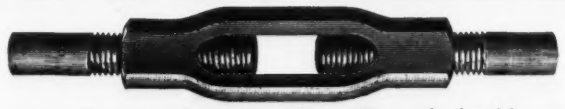

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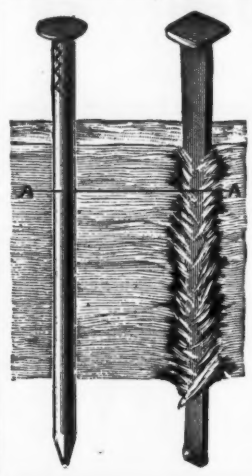

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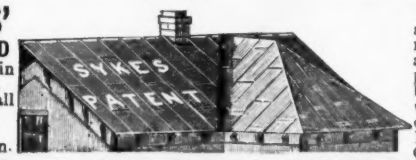

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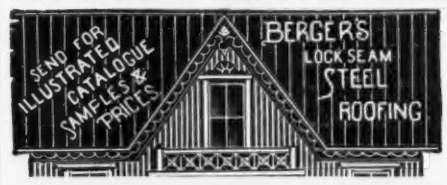

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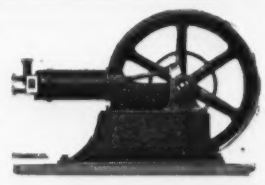

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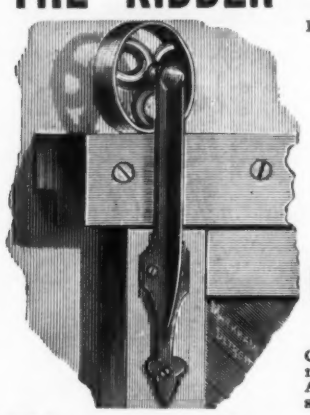

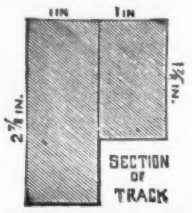

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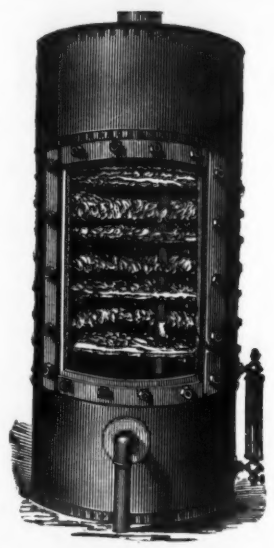

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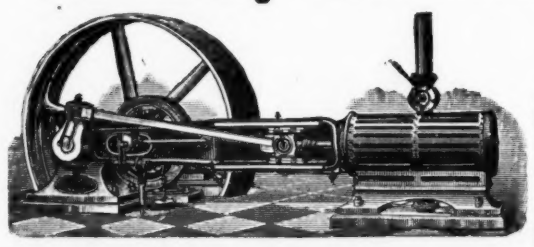

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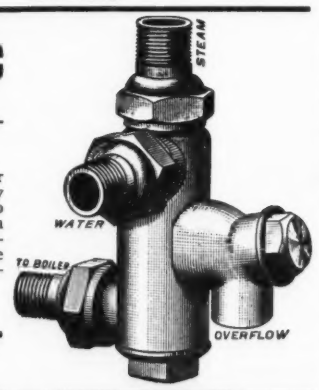

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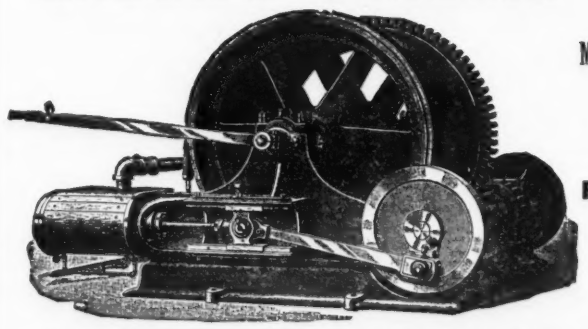

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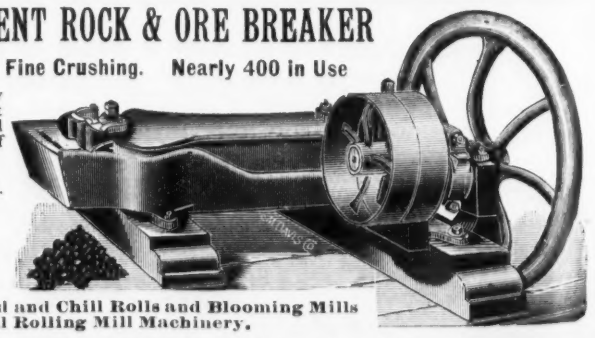

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